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BLUE JAY

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Editors: Anna and Ted Leighton. 328 Saskatchewan Crescent West, Saskatoon, SK S7M 0A4. Canada. E-mail : leighton@sasktel.net
Associate Editors : Mark Brigham. Rainer Ebel, Marlene Evans, Ronald Hooper, Stuart Houston, Joanne Marchand. Josef Schmutz. Robert Warnock.

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COVERS: Front - Tundra Swan pair nesting near the Patience Lake potash mine, east of Saskatoon
Photograph by George Tosh, 9 June 2003
Back - Tundra Swan family near Patience Lake
Photograph by George Tosh, 9 June 2003

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WILDERNESS PRESERVED: NATURE SASKATCHEWAN'S SANCTUARIES

D.P. PESCHKEN, 2900 Rae Street, Regina, SK S4S 1R5, e-mail:peschken@accesscomm.ca

Introduction

Nature Saskatchewan administers six sanctuaries, five of which it owns. Two are located in the Aspen Parkland Ecoregion of the Prairie Ecozone, the other four are in ecoregions of the Boreal Plain Ecozone (Fig. 1, Table 1). They vary in size from nearly 6.5 ha to 162 ha, and feature grasslands, bluffs, deciduous and coniferous forests, and wetlands. I will give an overview of each of the sanctuaries, starting from the south and moving north, and describe the ecological features and location as well as some results of the plant, bird, mammal, aquatic macroinvertebrate and lichen surveys.

The surveys were done as part of the Nature Sanctuary Inventory Project, initiated by Diana Bizecki Robson in 1997. This project is ongoing. While the survey data available to date are by no means complete, they are probably among the most extensive for any natural areas in the province. Fairly complete lists of birds have been compiled for Crooked Lake Fen, Van Brienen Land, Turtle Lake and Maurice G. Street Wildlife Sanctuary, with partial lists for the other sanctuaries. Vascular plant lists are available for all the sanctuaries. Lichen inventories have been done for all except Turtle Lake, (where a survey is planned for 2003) and aquatic macroinvertebrate surveys for all but Brandon Land and Maurice G. Street. Lists of mammals are available for Crooked Lake, Van Brienen Land and Turtle Lake, and a few mammals are listed for Rendek Elm Forest and Brandon Land. A list of reptiles and amphibians has been compiled for Turtle Lake and only one amphibian is listed for Rendek Elm Forest. Table 1 provides the references for survey information for each sanctuary. Most of the inventory information is unpublished and available only from the Nature Saskatchewan office in Regina. The exceptions are the lists of lichens at Crooked Lake Fen [14] and vascular plants at Rendek Elm Forest [7, 19] published in *Blue Jay*, and the results of the aquatic macroinvertebrate surveys which are available on the internet at http://www.usask.ca/biology/skabugs/index.html.

Nature Saskatchewan administers the sanctuaries as conservation areas, to prevent development, preserve habitat and for the enjoyment of its members and the general public. Although none are posted with "No Trespassing" signs, to prevent overuse, the areas are not advertised. People may visit the sanctuaries on their own. However, the stewards have an intimate knowledge of our sanctuaries and if visitors contact them previous to a visit, they often are glad to act as guides, time permitting.

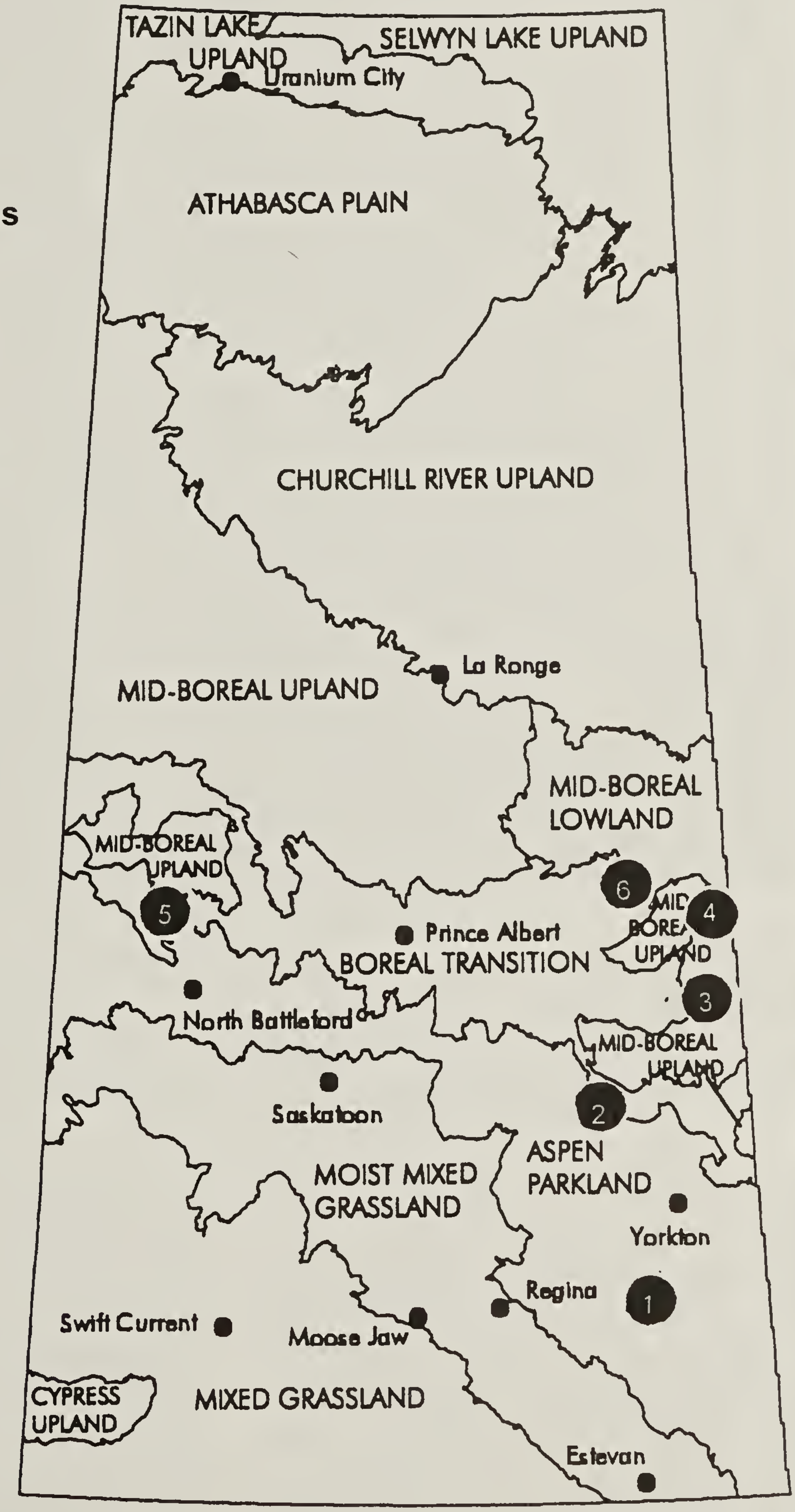
Crooked Lake Fen Nature Sanctuary

Location and features (see Figure 2). This small sanctuary (less than 20 ha) contains a floating or "quaking" fen within the Qu'Appelle River Valley. The fen is an excellent example of a seepage fen, an uncommon habitat in Saskatchewan. Underground springs promote lush, varied vegetation which attracts birds during migration and the breeding season. The area also features a saline alluvial plain within a glacial valley, an oxbow of the Qu'Appelle River, a delta, a cattail marsh, steep valley

Fig. 1. The Ecoregions of Saskatchewan (Map Source: The Ecoregions of Saskatchewan [1])

Approximate locations of the sanctuaries:

1 Crooked Lake Fen.
2. Van Brienen Land.
3. Brandon Land.
4. Rendek Elm Forest.
5. Turtle Lake
6. Maurice G. Street



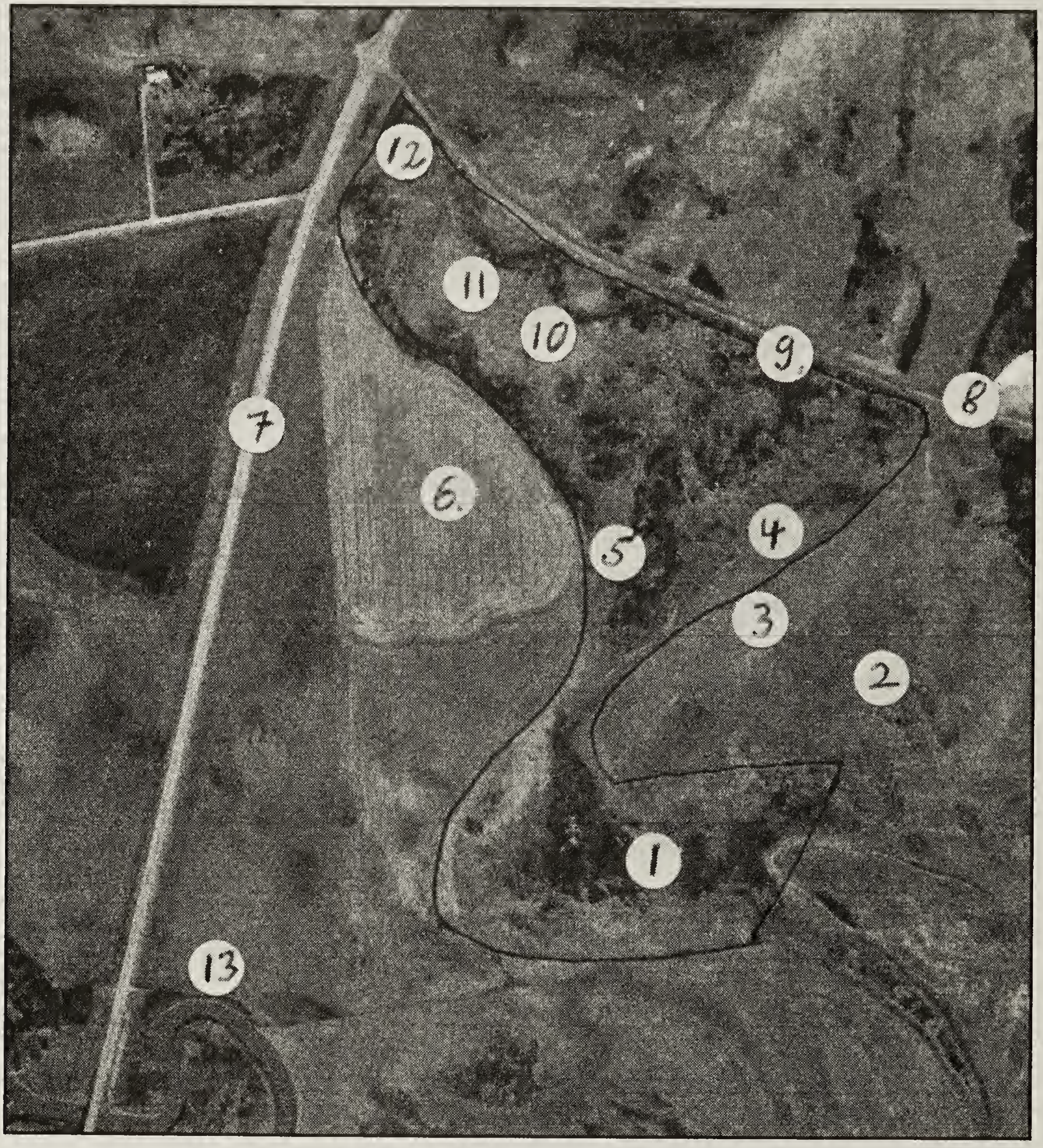


Fig. 2. Aerial View of Crooked Lake Fen Nature Sanctuary. Scale 1:10,000. ↑N Legend: 1. Stream/Wet Marsh. 2. Hayland. 3. Approximate border of Sanctuary. 4. Wet marsh. 5. Wet meadow, River Birch dominant. 6. Cultivated field. 7. Highway 47. 8. Highway 247. 9. Hardwood forest, Balsam Poplar dominant. 10. River Birch stand. 11. Wet cattail marsh. 12. Manitoba Maple stand. 13. Qu'Appelle River.

slopes and an aesthetically pleasing "terraced garden." There are four other fens nearby which, along with the sanctuary, contain plant species found nowhere else in the Qu'Appelle Valley. The sanctuary is listed under the International Biological Program as the I.B.P. Area 71-3.[2] Bernard de Vries reported further details.[14]

History. The site was purchased in 1988.

Stewards are John Pollock (306-735 2921) and Boyd Metzler (306-735 2380 or 306-793 2911), both of Whitewood, SK.

Inventory highlights. The list of 57 species of birds for Crooked Lake Fen includes the Lazuli Bunting, Virginia and Yellow rails, Sora and four species of warblers.[16] The 107 plant species include the rare Striped Coralroot (*Corallorhiza striata*) and Garber's Sedge

(*Carex garberi*).[16, 25, 26] The unique mix of 68 aquatic macroinvertebrate taxa include species which are 'typical of cool boreal streams and springs'.[22-24] In 2002, 22 species of lichens were recorded, among them two rare lichens, the Boreal oakmoss lichen (*Evernia mesomorpha* Nyl.) and Punctured ramalina *(Ramalina* cfr. *dilacerata* (Hoffm.) Hoffm.).[14] Lesser Burdock (*Arctium minus)* is one of the most conspicuous invasive plant species in the sanctuary. The barbs of mature seed heads can trap and kill warblers.[29] A large population thrives along the south side of the ditch along Highway 247 and a few steps into the forest. Efforts are being made to control the spread by annually removing flower stalks.

To get there, drive from the junction of Highways 1 and 47 at Grenfell to about 30 km north on Highway 47 to Highway 247 just north of the bridge over the Qu'Appelle River. The sanctuary lies south and east of the junction and starts a few steps east of the junction with the stand of Manitoba Maple (*Acer negundo*). The boundaries are not marked.

To enjoy the sanctuary, walk around the periphery which takes 1 to 2 hours, depending on whether one crosses the creek at the narrow portion of the preserve. Start at the northwest corner, near the junction of Highways 47 and 247. From here (Brome Grass Meadow) and from the hill in the small native grassland, there is a beautiful view of the River Birch stand, the cattail marsh, and the Qu'Appelle Valley beyond. Walking south along the west margin of the sanctuary, there are mature Manitoba Maples on the east and a view of the valley to the south and west. Toward the southern tip of the maple forest, take a few steps through the shrubby vegetation to find the confluence of two small but swiftly flowing streams which meander south. Bird song is heard everywhere on a spring morning. In June 2001, the meadow east and west of the narrow connection between the north and south portions was ablaze with False Dandelion (*Agoseris glauca*).[26] After crossing the stream at the most narrow portion of the preserve and proceeding northeast along the Wet Marsh, you will find numerous, clear calcareous pools. Wandering along the ditch of Highway 247 and penetrating a few steps into the Balsam Poplar (*Populus balsamifera*) forest, the rare Striped Coralroot thrives. Please step carefully when exploring the sanctuary.

Van Brienen Land Nature Sanctuary

Location and features (see Figure 3). Located about 11 km southwest of Kelvington, this rectangular (800 m x 281 m) preserve covers 22.7 ha and includes 8.1 ha of cultivated land, 8.1 ha of lush woodland, and about 6.5 ha of Meadow Bank Lake. The lake lies adjacent to and north of the sanctuary and is approximately 2.4 km x 0.4 km. In the forties, the lake was dry, and the land was sold to adjacent landowners. A few years later it filled up again. Thus, Van Brienen Land includes a portion of the bottom of a lake. The forest is dominated by Balsam Poplar with a sprinkling of Aspen Poplar (*Populus tremuloides*) and Manitoba Maple, over a dense understory of Twining Honeysuckle (*Lonicera dioica*), Low-bush Cranberry (*Viburnum edule*) and numerous herbaceous plants.[27] There is a small, shrubby meadow at the east end.

History. In 1906, Mr. and Mrs. William Harrison homesteaded the quarter section immediately west of the sanctuary. Their daughter, Sylvia van Brienen, bequeathed 22.7 ha of land valued at $8,400 to Nature Saskatchewan on March 1, 1993.

Stewards are Brian Irving, Kelvington (306-327 4834) and Sandra MacDougal, Wadena (306-327 4816).

Inventory highlights. Brian Irving, who lives only 3.2 km from Van Brienen Land, has recorded the plants, birds and mammals in the sanctuary, on the lake and within a 4.8 km radius starting in 1965.[27] In total, he has

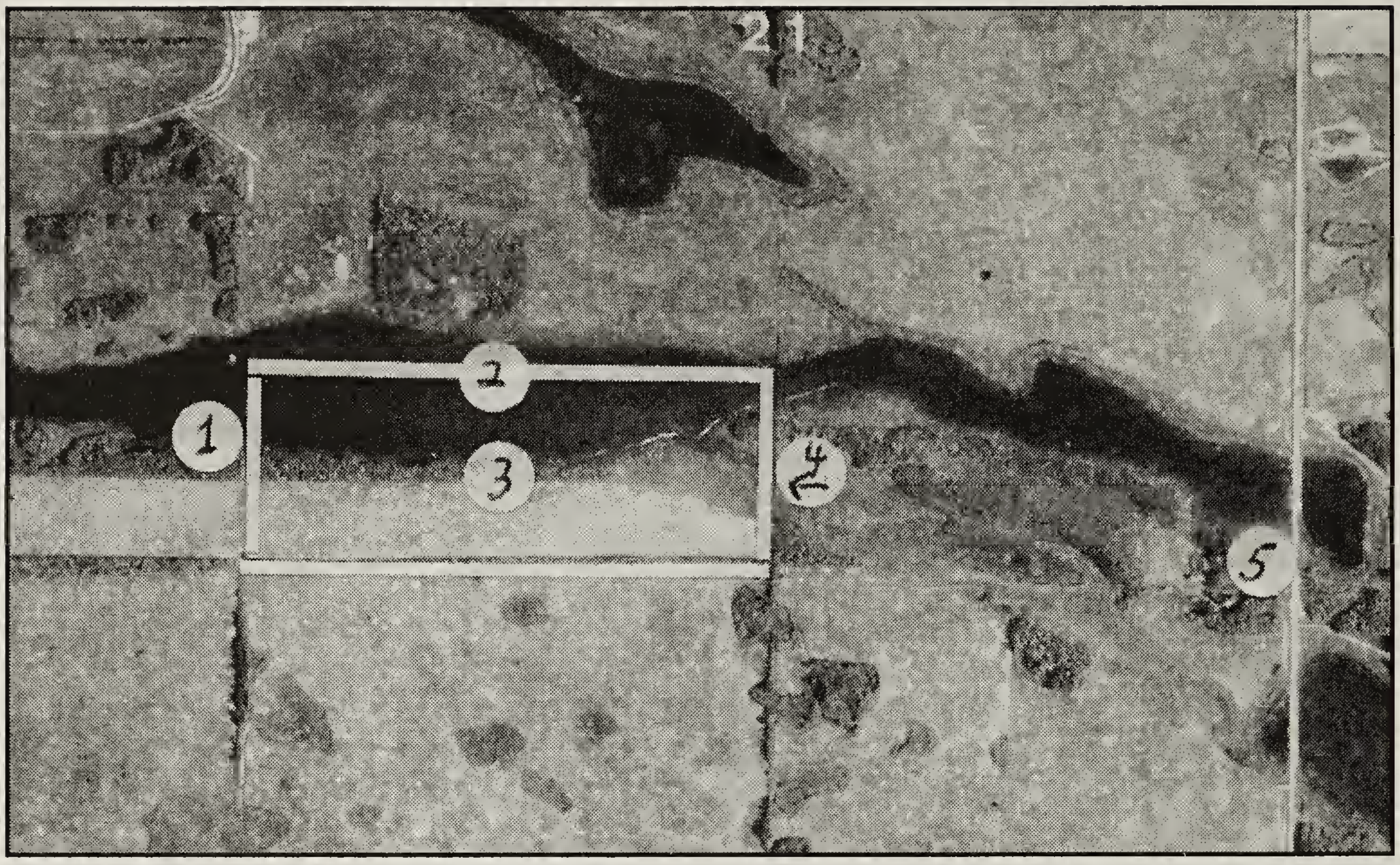


Fig. 3. Aerial view of Van Brienen Land Nature Sanctuary. Scale 1:20,000. ↑N Legend: 1. Border. 2. Meadow Bank Lake. 3. Forest. 4. Small meadow. 5. Access point by boat (see text)

observed 18 species of mammals or their tracks, and nineteen species of waterfowl which breed on the lake or in the sanctuary. The Least, Baird's and Pectoral Sandpipers stop at the lake during their migration from wintering grounds in the southern United States and South America and their breeding habitats in the arctic and subarctic. A total of 19 woody and 111 herbaceous plant species were recorded, of which 87 were native. The 20 identified lichen species include the Sunburst lichens (*Xanthoria*), often seen as colorful patches on Aspen and Balsam poplars.[13] One of the 125 taxa of aquatic macroinvertebrates found in the Meadow Bank Lake is the Green Darner (*Anax junius),* a large dragonfly that migrates between this lake and central and northern states.[23,24]

To get there by land, you have to pass through fields owned by Leonard Harrison, brother of Sylvia van Brienen. Permission should be obtained by contacting steward Brian Irving. It is also possible to reach the sanctuary by canoe. Drive from the junction of Highway 35 and Hendon Road (which runs east-west through Hendon), 11.2 km east and 1.6 km north on grid road # 665 to the east end of Meadow Bank Lake. From here, canoe 0.8 km to reach the sanctuary's eastern boundary. The boundaries are not marked.

To enjoy the sanctuary, it is best to enlist the guidance of Brian Irving. The narrow wildlife trails through thick undergrowth are not easy to find. Walking along the tranquil shore of the shallow lake, visitors may observe tracks, even those of moose, in the soft muck, a beaver lodge, and lichens on rocks and fallen trees. Deer frequent the meadow. For a few hours of enjoyment far from the "madding crowds" of cities and tourists, visit the Van Brienen Land Nature Sanctuary.

Brandon Land Nature Sanctuary

Location and features (see Figure 4). Perched on the east bank of a shallow valley and divided by Highway 49, the 6.47 ha property (457 m x 201 m, minus the area of the highway), is located about 8 km east of

Norquay and marked by a cairn on the north side of highway near the sanctuary's east border. The smaller portion on the north side of the highway is dominated by immature Aspen Poplar with some willow (*Salix* spp.) and tall shrubs, merging down the slope with a stand of White Spruce (*Picea glauca*). The larger southern portion, although logged some years ago, features some mature White Spruce with Aspen and Balsam poplars, and various tall shrubs. The west side touches on a series of swamps that together form Snake Creek where mature Black Spruce (*P. mariana*) and Tamarack (*Larix laricina*) flourish.

History. The preserve was donated to Nature Saskatchewan by Bette Brandon and Donna Green in memory of their parents, Lorne and Christine Brandon, who originally owned the land and are buried in the cemetery across the road from it. The sanctuary was formally dedicated by Lionel Hughes on May 29, 1999 with the unveiling of a bronze plaque mounted on a cairn.

Stewards are Lionel and Michelle Hughes, Norquay, SK (306-594 2455) and David Weiman, Preeceville, SK (306-547 4661).

Inventory highlights. Vern Harms compiled a list of 112 vascular plants, only five of which are introduced.[18] Garth Nelson, David Weiman and Lionel Hughes recorded four bird and two mammal species.[21] Twenty-five lichen species in 14 genera were recorded, including species representative of the boreal forest and the prairies, reflecting the sanctuary's location in the Boreal Transition Ecoregion.[11]

To get there, drive about 8 km east of Norquay on Highway 49 and watch for the above mentioned cairn on the north side of the road.

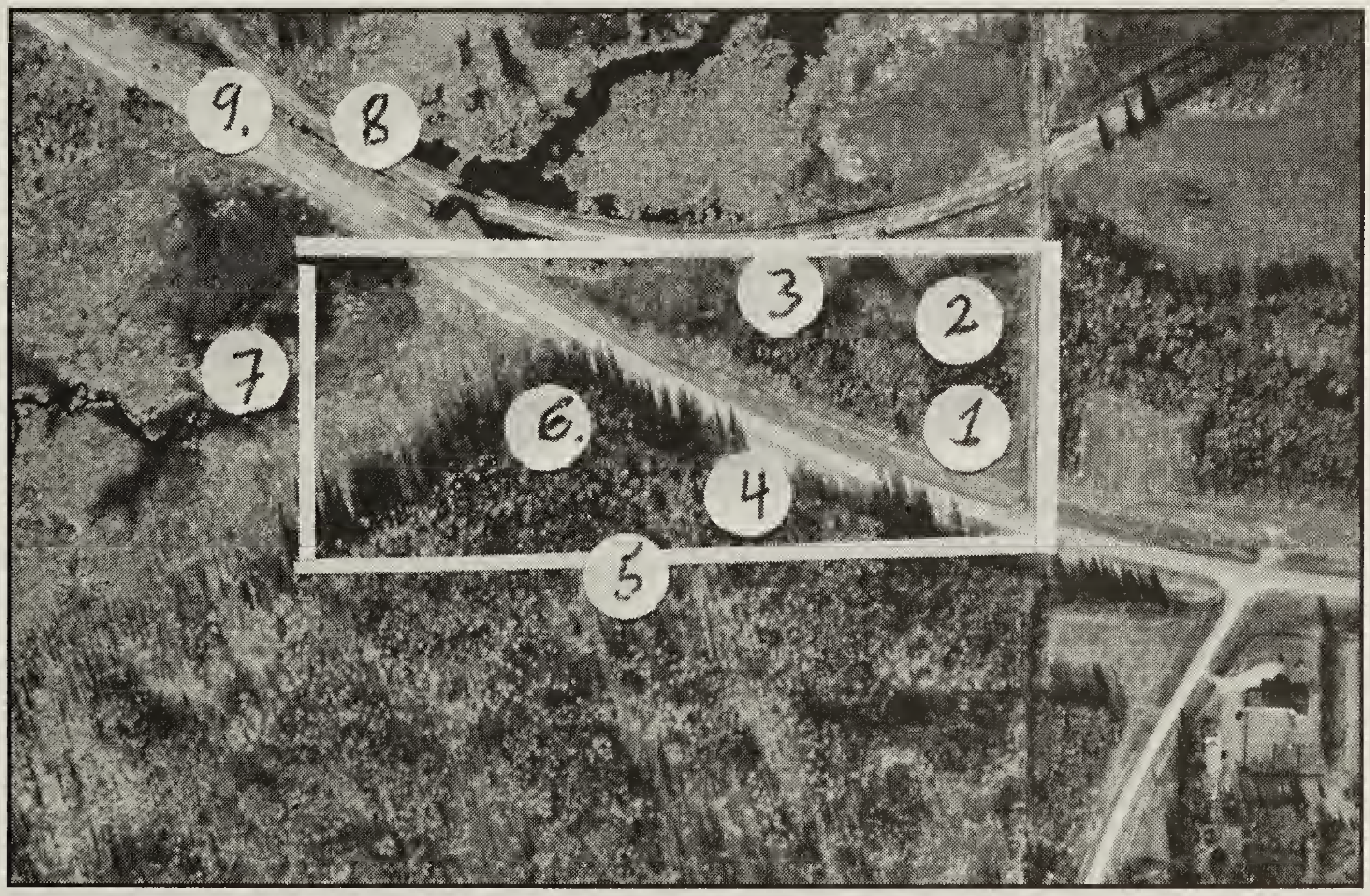


Fig. 4. Aerial view of Brandon Land Nature Sanctuary. Scale 1:8,000. ↑N
Legend: 1. Cairn marker. 2. Immature Aspen poplar. 3. Second growth White Spruce. 4. Second growth White Spruce and Balsam Poplar with some mature spruce and poplars. 5. Sanctuary border. 6. Black Spruce and Tamarack in wet places. 7. Snake Creek. 8. Railroad track. 9. Highway 49.

To enjoy the sanctuary, put on good hiking boots and suitable clothing because there are no formal trails. Be prepared for dense understory, and on the west side, look out for swampy areas especially in the portion south of the highway.

Rendek Elm Forest Nature Sanctuary

Location and features (see Figure 5). The Rendek Elm Forest Nature Sanctuary is 14.2 ha in size and located about 24 km northeast of Hudson Bay at the confluence of Smoking Tent Creek and the Red Deer River. The area floods periodically. Mature American Elm (*Ulmus americana*) cover about 75% of the land; Manitoba Maple and Balsam Poplar are concentrated on the east side. Tall shrubs, such as Red-osier Dogwood (*Cornus stolonifera*) and High-bush Cranberry (*Viburnum trilobum*) form the woody understory. A striking feature is the luxurious Ostrich Fern (*Matteuccia struthiopteris*) that forms the dominant part of the understory over large areas of the elm forest. Spotted Joe-pye Weed (*Eupatorium maculatum*) and Tall Meadow-rue (*Thalictrum dasycarpum*) thrive along the semi-open river bank.[6] Unfortunately, in 1999 two elm trees were found infected by Dutch Elm disease.[7, 19,20] By 2002, the disease had spread to six trees in as many groups of elms (Alex Rendek, 2002, pers. comm.). Nature Saskatchewan considered it financially and environmentally irresponsible to attempt to control Dutch Elm Disease here, and it was decided to let nature take its course. It is hoped that Manitoba Maple and Balsam Poplar will fill the gaps left by the dying elms. The trails will be kept open and as safe as possible.

History. In 1989, Don Hooper persuaded the owner, Alex Rendek, to sell the area to Nature Saskatchewan and the Saskatchewan Wildlife Federation. The sanctuary was officially opened in 1991. Nature Saskatchewan is responsible for administering the preserve.

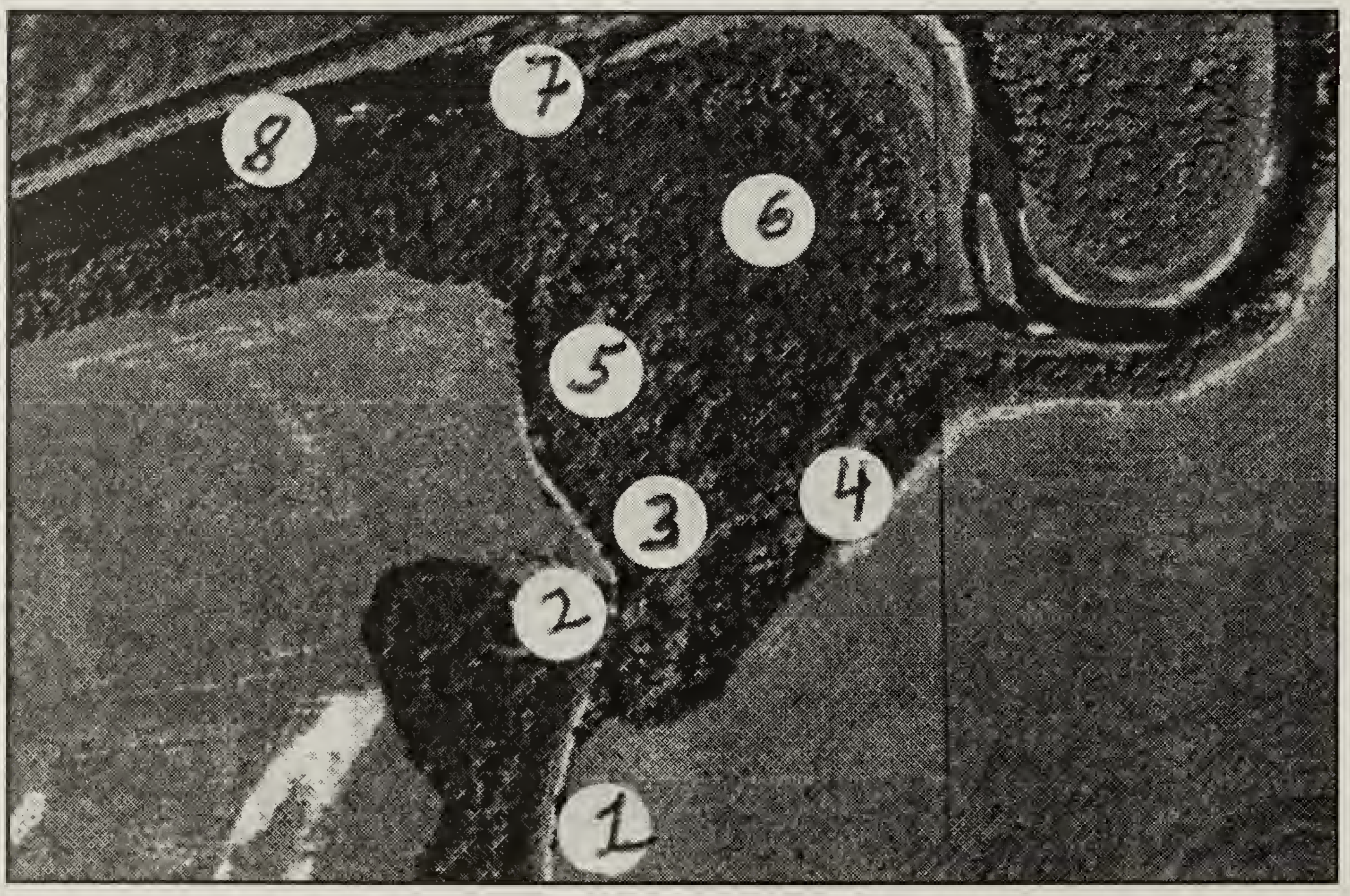


Fig. 5. Aerial view of Rendek Elm Forest Nature Sanctuary (Courtesy of Weyerhaeuser). Scale approximately 1:12,000. ↑N
Legend: 1. Access road. 2. Bridge over Smoking Tent Creek. 3. Nodding Trilliums. 4. Smoking Tent Creek. 5. Manitoba Maple Forest. 6. Mature American Elm and Ostrich Fern. 7. Small parking area. 8. Red Deer River.

Stewards are Alex Rendek (306-865 3147) and Moe Alain (306-865 3266), both of Hudson Bay, SK.

Inventory highlights. Seventy-eight plant species were recorded in the sanctuary, including five species considered rare in Saskatchewan: Smooth Yellow Violet (*Viola pubescens*), Blue Monkey-flower (*Mimulus ringens),* Assiniboia Sedge (*Carex assiniboinensis),* Nodding Trillium (*Trillium cernuum*), and Red Elderberry (*Sambucus racemosa* spp. *pubens*).[7,19] The list of birds includes 196 species that likely occur in the sanctuary according to the *Atlas of Saskatchewan Birds*, only 8 of which have actually been observed in the sanctuary because little time has been spent bird watching.[6, 28] Twenty-two lichen species have been identified.[12] In the Red Deer River adjacent to the sanctuary, 172 taxa of aquatic macroinvertebrates were identified, the highest number among similar surveys carried out in three other Nature Saskatchewan sanctuaries. This reflects the typically greater diversity of species in lotic (flowing) aquatic habitats than in lentic (still) aquatic habitats.[22-24]

To get there, drive east from Hudson Bay on Highway 3. After about 14 km, just east of where Smoking Tent Creek crosses the highway, there is a white sign on the north side of the road pointing to the Rendek Elm Forest. Travel north on a gravel road for about 4.8 km to the sign marking the entrance.

To enjoy the sanctuary, park in the small parking lot located in the northwest corner near the Red Deer River and follow the marked trail. You may feel dwarfed by the elms, many of them towering up to 23 m, and Ostrich Ferns which reach over even a tall person in some locations. Occasionally, the trail leads to lookout points above the Red Deer River and Smoking Tent Creek. This is bear country, so make some noise on your walk. Brochures are available from the Hudson Bay town office.

Turtle Lake Nature Sanctuary

Location and features (see Figure 6). The 48.5-ha Turtle Lake sanctuary is located about 35 km northwest of Glaslyn along the east shore of Turtle Lake, between the resort beaches of Turtle Lake Lodge and Indian Point. It features cliffs with a lookout (#3, Fig. 6) 12 m above water level, upland mixed forest dominated by Aspen Poplar and White Spruce, an open meadow and a gravel pit that is slowly revegetating (#8, Fig. 6). A boreal wetland and a small sand spit near shore are frequented by many birds. A small pond provides habitat for toads and frogs (#9, Fig. 6). In the meadow, Smooth Brome (*Bromus inermis*) is crowding out native vegetation and the area may be mowed to suppress its growth.[9]

History. In 1993, Muriel Carlson and E. Merle Robinson initiated a preservation campaign for this land. With funds donated by Nature Saskatchewan members, resort dwellers, the general public, Cameco Corporation and Wascana Energy, the site was purchased from Saskatchewan Wildlife Habitat Trust. The official opening occurred on 12 June 1994. Once it became a sanctuary, the stewards found it difficult to restrict all-terrain vehicles (ATV's), so they developed an ATV trail just south of the sanctuary on the east-west road allowance that meets the paved grid road. The trail continues north in the ditch, then angles across the northeast corner of the sanctuary to meet the trail to the Turtle Lake Lodge. Users must stay on the trail or lose the privilege (M. Carlson, 2003, pers. comm.). In June 2002, the huge James Fire raged on the west side of the lake. Fire-fighting helicopters and storage areas were located in the southwest corner of the sanctuary, where many temporary campsites accommodated fire fighters for 23 days. Muriel managed to flag the orchid sites to prevent them from being trampled.[10]

Stewards are Muriel Carlson, Livelong, SK (306 845 3227), E. Merle Robinson,

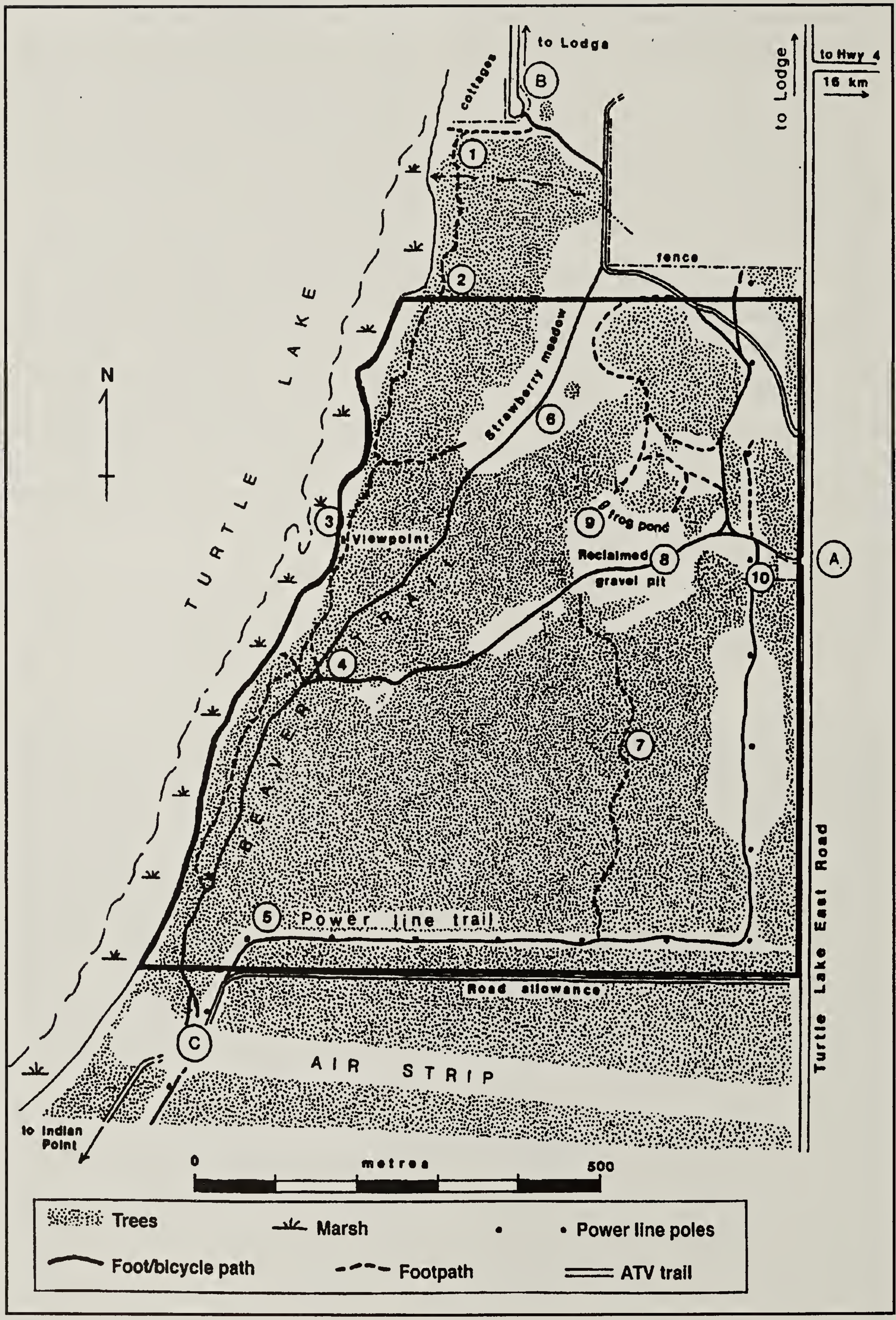


Fig. 6. Map of Turtle Lake Nature Sanctuary showing boundary, trails and other features. Letters A-C and numbers 1-10 refer to a detailed description of the trails in the brochure A Self Guiding Tour of the Turtle Lake Nature Sanctuary.

Livelong, SK (306 845 2857) and Michael Williams, Saskatoon (306 242 5383).

Inventory highlights

At least 167 species of vascular plants have been identified, including 7 trees, 26 shrubs and 138 herbs.[5] There are nine species of orchids, including Franklin's Lady's-slipper (also called Northern or Sparrow's-egg Lady's-slipper, *Cypripedium passerinum*) and Striped Coralroot.[17] Leather-leaved Grape Fern (*Botrychium multifidum*) occurs along the Power Line Trail.[9] One hundred and seventy-seven bird species have been seen within the preserve and on adjacent Turtle Lake.[5] The sanctuary, on the path of one of North America's major bird migration routes, experiences waves of passerines every May.[17] The forests are home to 18 species of mammals typical of boreal areas.[5] In addition, Muriel (M. Carlson, 2003, pers. comm.) has observed Mule Deer, Elk, Muskrat, Wolf and Fisher. She also reported the probable sighting of a Cougar. One snake, Western Plains Garter Snake (*Thamnophis radix haydeni)* and three amphibians have been recorded, including the Boreal Chorus Frog (*Pseudacris triseriata maculata*), Wood Frog (*Rana sylvatica*)[5] and Canadian Toad (*Bufo hemiophrys)* (M. Carlson, 2003, pers. comm.). Surveys of the aquatic invertebrate fauna in 2000-2002, yielded 101 taxa in Turtle Lake adjacent to the sanctuary, and an astonishing 76 in the Frog Pond, which covers only 7 square metres.[22-24]

To get there, drive about 25 km north from Glaslyn on Highway 4, then head west on a gravel road to Turtle Lake. The road terminates near the lake after about 16 km. From this "T" junction, drive south for about 600 metres to the parking lot on the west side of the road (Fig. 6, #10).

To enjoy the sanctuary, pick up the brochure "*A Self Guiding Tour of the Turtle Lake Nature Sanctuary*" from the Nature Saskatchewan office or Turtle Lake Lodge located just north of the sanctuary. Most trails are for foot traffic only; bicycles are allowed where indicated and there is a short trail in the northeast portion where ATV's are allowed. The best birding at Turtle Lake is along the power cut-lines (#5, Fig. 6) (M. Carlson, pers. comm) and the Beaver Trail (#4, Fig.6).[8] A walking tour takes about 2 hours.

Maurice G. Street Wildlife Sanctuary

Location and features (see Figure 7). The 162 ha preserve, 17 km northeast of Nipawin, covers the portion of section 1-52-14-W2 that lies east of the Saskatchewan River, plus the south half of section 12-52-14-W2 south of the Saskatchewan River. Maurice G. Street Wildlife Sanctuary features ancient flood-plain terrain as well as high ground overlooking the Saskatchewan River. It is heavily wooded with Tamarack, Balsam Fir (*Abies balsamea*), White Spruce, and Balsam and Aspen poplars. Jack Pine (*Pinus banksiana*) is dominant on the sandy upland soil. The Large Yellow Lady's-slipper (*Cypripedium calceolus* var. *pubescens*) and the rare Ram's-head Lady's-slipper (*Cypripedium arietinum*) grow in several locations.[4]

History. Stan Riome and Doug Phillips initiated the project to preserve the area. The Saskatchewan Natural History Society established the sanctuary in 1968, and aptly named it after Maurice Street (1910-1966), an ardent, self-taught naturalist of the Nipawin area. In his short life, Maurice identified over 245 bird species, collected the eggs of over 100, found the nests of 142 species, banded 13,214 individual birds and published over 28 papers in the Blue Jay.[3] Nature Saskatchewan has leased this property from Saskatchewan Environment since 1967 and is responsible for paying taxes and for general stewardship.

To get there, drive 6 km east on Highway 55 from the RCMP-KFC corner in Nipawin. Turn north onto a well-maintained road (which becomes a trail) and proceed for about 11 km. At the "T" junction, turn east (right) and then follow the trail as it turns

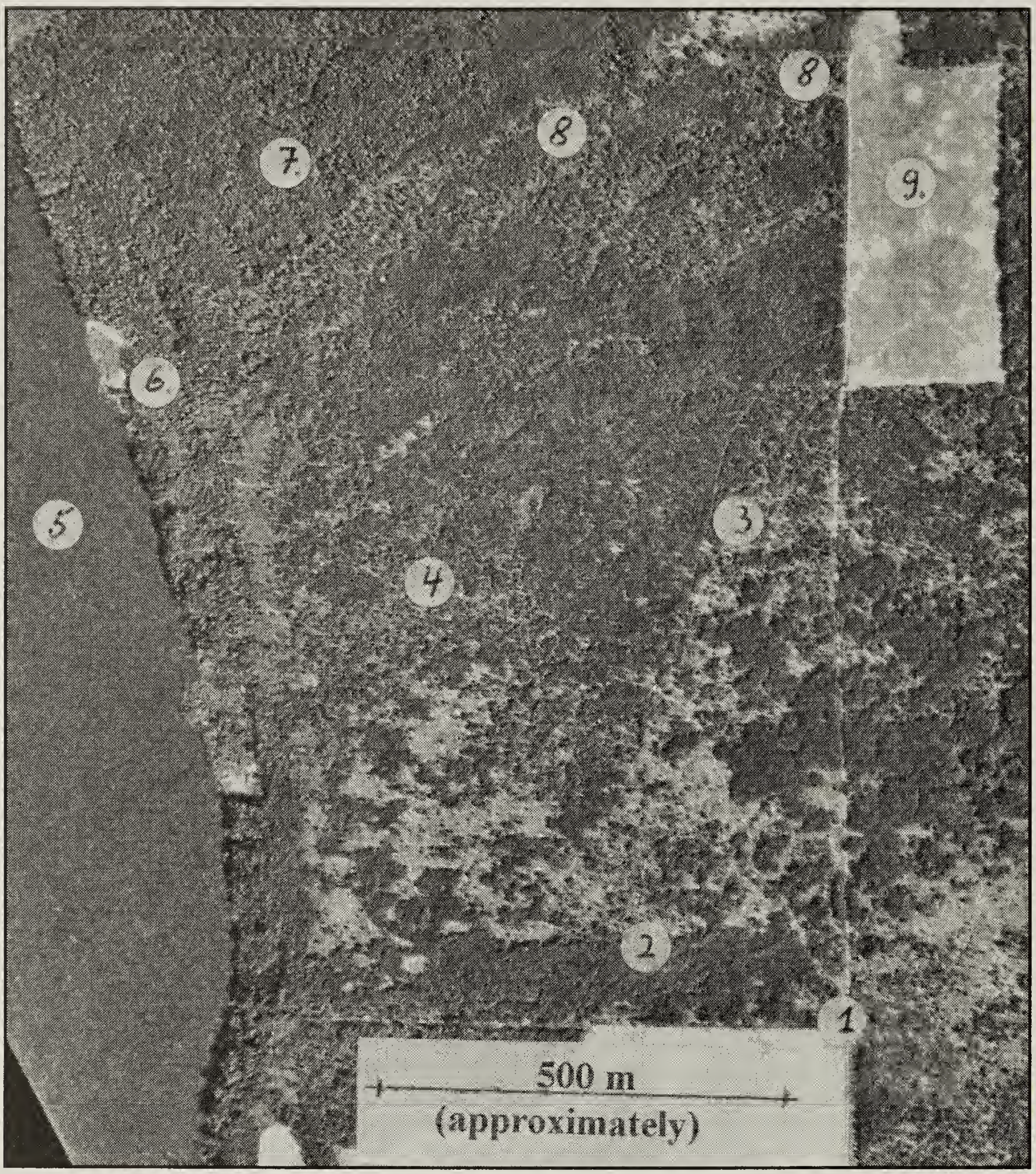


Fig. 7. Aerial view of Maurice G. Street Wildlife Sanctuary. ↑N
Legend: 1. Entrance sign, and south and east border. 2. West Corner trail. 3. Gerbil trail. 4. Look-off trail. 5. Saskatchewan River. 6. Look-off point. 7. Fern forest trail. 8. Log cabin trail. 9. Formerly cultivated, now regenerating forest land, owned by Doug (steward) and Shirley Phillips.

north (left) to reach the large entrance sign to the sanctuary.

Inventory highlights. About 65 vascular plant species are recorded for the sanctuary.[4] The list of 57 bird species includes Bald and Golden eagles, Common Loon, American Redstart and Pileated Woodpecker.[30] Fifty-five lichen species in 21 genera were identified in 2002.[15]

To enjoy the sanctuary, use the trails starting at the wooden entrance sign. Walking northwest through a tall Jack Pine forest leads to the "Look-off" point with a magnificent, panoramic view of the Saskatchewan River, which widens to become Tobin Lake. Silverberry flowers

Table 1. Location, ecological classification [1] and available inventories of Nature Saskatchewan's Sanctuaries.

Sanctuary	Ecozone [1]	Ecoregion [1]	Landscape Area [1]	Inventory data available[2]						Legal Land Description
				B [3]	VP	L	MI	M	O	
Crooked Lake Fen	Prairie	Aspen Parkland	Melville Plain	16, 25	16, 25 26	14	22, 23 24	16 25		within NW¼ 19-19-6-W2
Van Brienen Land	Prairie	Aspen Parkland	Quill Lake Plain	27	27	13	23, 24	27		within SW¼ 21-36-12-W2
Brandon Land	Boreal Plain	Boreal Transition	Swan River Plain	21	18	11		21		within SE¼ 25-33-1-W2
Rendek Elm Forest	Boreal Plain	Mid-boreal Lowland	Overflowing River Lowland	6	7, 19	12	22, 23 24	6	6	within 5-25-45-1-W2
Turtle Lake	Boreal Plain	Mid-boreal Upland	Thickwood Upland	5, 17	5, 9 17		22, 23 24	5 9	5	portion of 28-53-18-W3
Maurice G. Street	Boreal Plain	Boreal Transition	Tobin Lake Lowland	30	4	15				portions of 1 & 12-52-14-W2

1. Source: Acton, Padbury and Stushnoff 1998
2. Numbers refer to references listed at the end of the article
3. B - Birds, VP - Vascular plants, L - Lichens, MI - Macroinvertebrates, M - Mammals, O - amphibians and reptiles

(*Elaeagnus commutata*) fill the air with their fragrance in June. From the "Lookout," the Log Cabin Trail leads northeast out of the sanctuary to the private land of Doug and Shirley Phillips. Walk slowly and you might see the unexpected such as the beautiful Polyphemus Moth (*Anthraea polyphemus*).

Discussion

Some people believe that large natural areas such as Maurice G. Street Wildlife Sanctuary are more valuable than small ones, such as Crooked Lake Fen or Van Brienen Land. While it is certainly true that the larger the preserve, the more wildlife is protected, small areas still have value. When a visitor hikes in June along the margins of Crooked Lake Fen, or along the shore adjoining Van Brienen Land, the great variety of bird song is testimony that many species make their homes here.

The flora and fauna of the sanctuaries reflect their different locations from the Aspen Parkland Ecoregion to the Boreal Transition, Mid-boreal Upland and Mid-boreal Lowland Ecoregions. For example, at Van Brienen Land, poplars constitute the forest, while at Maurice G. Street, Jack Pine and White Spruce are dominant, and at Turtle Lake, a mixed forest of broadleaf and evergreen trees prevails. The lichen flora and the diversity of the macroinvertebrate fauna both indicate that water and ambient air are healthy in the four sanctuaries where surveys for these species have been made. Lichens were most frequent in the Maurice G. Street Sanctuary, probably because of the relatively open canopy.[15] All the surveys, but perhaps particularly those for lichens and macroinvertebrates, constitute good baseline data.

Acknowledgments

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BREEDING BIRD ABUNDANCE AND HABITAT ALONG THE DES LACS RIVER VALLEY, NORTH DAKOTA

ROBERT K. MURPHY, U.S. Fish and Wildlife Service, Des Lacs National Wildlife Refuge Complex, 8315 Hwy 8, Kenmare, ND 58746 (bob_murphy@fws.gov) and MARRIAH L. SONDREAL, College of Natural Resources, University of Wisconsin, Stevens Point, WI 54481 (current address: N8386 County Highway D, Belleville, WI 53508)

The Des Lacs River originates in se Saskatchewan and extends 100 km into nw North Dakota before joining the Souris River about 15 km nw of Minot (Figure 1). In the late 1800s, just before settlement along the river by peoples of European descent, the valley of the "Riviere de Lacs" was mixed-grass prairie.[7] In 1878, Elliot Coues described the makeup of breeding birds along the Saskatchewan-North Dakota border,[5] including the Des Lacs and Souris rivers. Bird habitat along the Des Lacs River valley has changed markedly since. Woodlands developed after extirpation of bison in the region during the 1870s and, especially, after many decades of fire suppression following settlement.[4, 7] The prairie was converted to annually tilled croplands, except for a 0.5- to 2-km wide band of prairie which still exists along the river. Nearly half of this extant prairie lies within the boundaries of Des Lacs National Wildlife Refuge (DLNWR), which encompasses the river valley just south of the Saskatchewan-North Dakota border

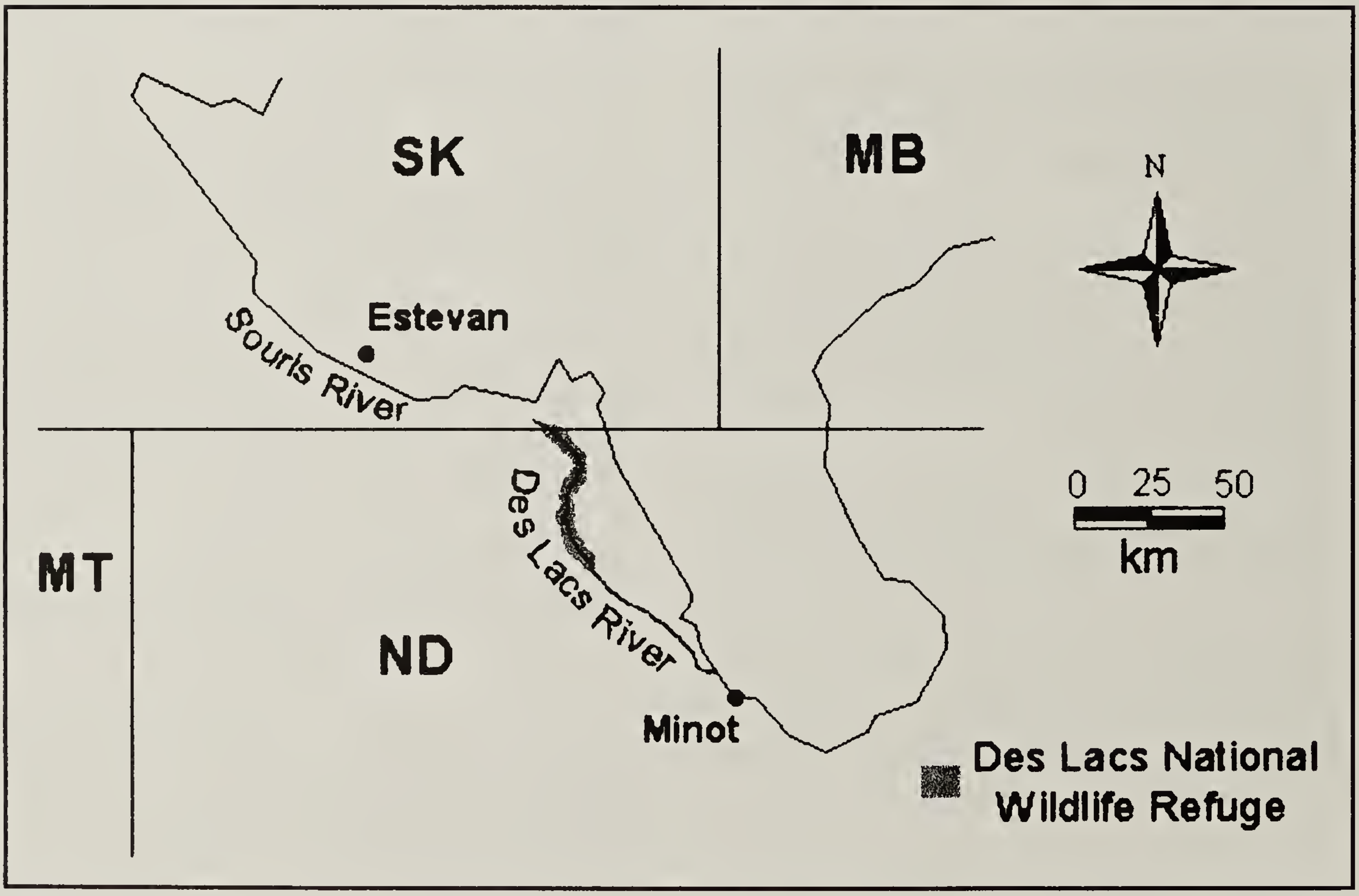

Figure 1. Location of Des Lacs National Wildlife Refuge along the Des Lacs River valley in nw North Dakota.

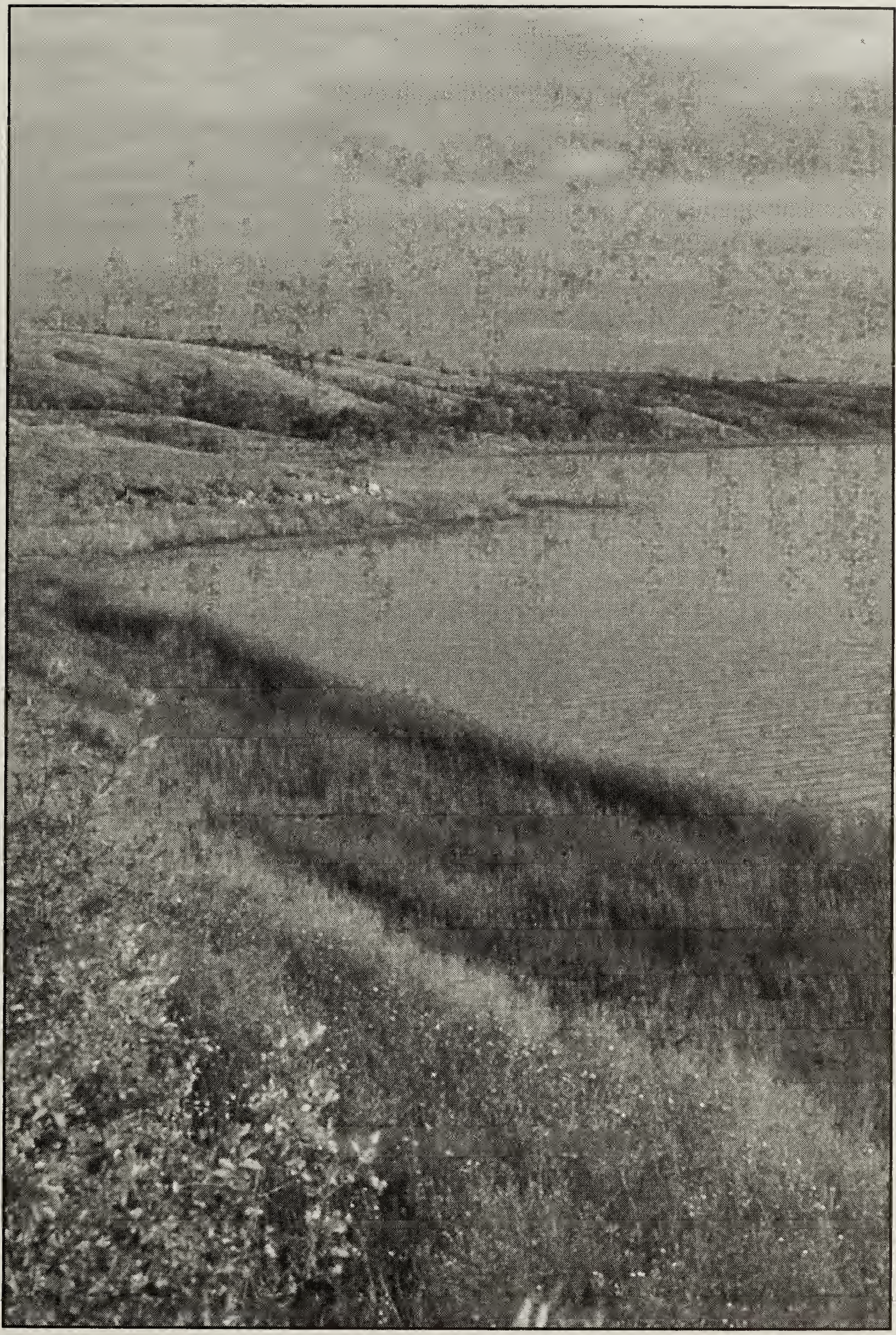

Figure 2. The Des Lacs River valley in late summer, south of the Saskatchewan-North Dakota border.

(Figures 1 and 2). The refuge presents an opportunity for preserving native prairie and its associated bird life. No quantified description of contemporary breeding birds and their habitat associations exists for this major river valley, however. Our objective was to fill this information gap and help identify local opportunities and limitations for meeting habitat needs of bird species of regional and international conservation concern.

Study Area and methods

DLNWR encompasses the Des Lacs River valley in Burke and Ward counties in nw North Dakota, stretching south 42 km from se Saskatchewan. The valley of the Des Lacs River was created when glacial meltwater cut through a vast regional ground moraine known as the Drift Plain.[3] Today the upland topography changes from the gently rolling Drift Plain to steep (>15 ^{0}) slopes that descend 15 to 80 m to the river (elevation about 544 m). The slopes are interrupted by wooded draws and coulees, which have intermittent streams that drain the adjacent Drift Plain. The narrow (1-3 km wide), 7913-ha riverine refuge includes about 2025 ha of impounded open water and 280 ha of marsh and wet meadow bordered by roughly 5600 ha of upland habitats. Upland soils are mostly well-drained, level to steep loams formed in glacial till. The area climate is continental, with short summers and long cold winters; annual precipitation averages 45 cm (U.S. Fish and Wildlife Service [FWS], unpubl. refuge data). Our survey in 1994 followed a series of relatively dry years (1988-1993, average annual precipitation = 35 cm), and the survey in 2001 occurred after many wet years (1994-2000, average annual precipitation = 51 cm).

We identified five major upland habitats on the refuge: (1) woodland (351 ha): east- to north-facing slopes along the valley and adjacent coulee bottoms, with more than 50% tree canopy cover, primarily Green Ash (*Fraxinus pennsylvanica*) and American Elm (*Ulmus americana*); (2) woodland-prairie edge (roughly 1500 ha): east- to north-facing slopes along the valley and parts of adjacent Drift Plain, variably (5-50%) wooded with trees and tall shrubs, mostly Green Ash and Chokecherry (*Prunus virginiana*); (3) prairie slope (roughly 750 ha): south- to west-facing slopes of the river valley, generally consisting of native prairie dominated by grasses and forbs especially needlegrasses (*Stipa* spp.), wheatgrasses (*Agropyron* spp.), Sideoats Grama (*Bouteloua curtipendula*), Little Bluestem (*Schizachyrium scoparium*), Big Bluestem (*Andropogon gerardii*), and members of the legume and aster families; (4) drift prairie (roughly 2250 ha): level to rolling (<5^0) native prairie on the Drift Plain, dominated by a mix of Smooth Brome (*Bromus inermis*), Kentucky Bluegrass (*Poa pratensis*), Western Snowberry (*Symphoricarpos occidentalis*), and Silverberry (*Elaeagnus commutata*); (5) dense nesting cover (752 ha): cultivated tracts of Drift Plain that have been seeded to a mixture of introduced species of grasses and forbs to provide nesting cover mainly for ducks.

We used point counts[8] to survey breeding birds throughout uplands at DLNWR from the end of May through June in 1994 and 2001. We used 30-m radius point count plots in woodland, and 75-m radius plots in other more open, habitats. Plots for woodland, prairie slope, and prairie-woodland edge were along 300- to 1000-m long transects that followed the mid-slope between the Drift Plain (above) and the river or bottoms of adjoining coulees (below). Plots on the Drift Plain were on transects that crossed through the approximate center of representative dense nesting cover and drift prairie habitats. We typically randomized our starting point on each transect and then spaced plot centers at least 200 m apart by pacing. We conducted surveys in 2001 in most of the same general areas used in 1994, although we seldom used any one plot in both years. Habitat of each plot was classified in the field as woodland, woodland-prairie edge, prairie slope, drift prairie, or dense nesting cover based on the dominant vegetation, slope, and aspect. We surveyed birds across all major upland habitats regardless of management history (for example, some areas had been prescribe-burned the previous year, or were being grazed by livestock), although we excluded dense nesting cover areas that were being disked in preparation for reseeding.

We surveyed each plot once for eight minutes between 5:30 and 8:30 AM. We occasionally surveyed birds until 9:00 AM on unusually calm mornings, and did not conduct surveys during steady rain or strong (>25 kmph) winds. Each plot was entered slowly to note birds that might be disturbed by our approach. We recorded numbers of singing males of each species in each plot and excluded non-singing birds from our summaries except for obvious breeding pairs (e.g., a pair of adult sparrows carrying food and eliciting threat notes). For species that use aerial displays to attract mates and defend territories (e.g., Sprague's Pipit), we recorded a singing individual if its flight path crossed over the plot during our survey. Birds detected outside each plot but within the same respective habitat type also were recorded to help us build a list of infrequently encountered species.[8] We generally considered a singing male to indicate a breeding pair, but calculated the abundance of Brown-headed Cowbird and Cedar Waxwing at each point by dividing the total number observed by two.[12] For every species we calculated the average number of indicated pairs per point count plot in each habitat class for 1994 and 2001. We also plotted the percentage frequency of occurrence for common species (i.e., those with an average abundance of more than 0.1 indicated pairs/plot in at least one year), to look for large differences in species occurrence between study years.

Results

We recorded 72 species of breeding birds (475 and 247 plots surveyed in 1994 and 2001, respectively; Table 1). This total excludes shorebirds that nested in margins of seasonally flooded wetlands in the Drift Plain such as Wilson's Snipe and Wilson's Phalarope; seven species of upland-nesting ducks; four swallow species that foraged over prairie slope, drift prairie, and dense nesting cover habitats but nested elsewhere; and several non-breeding late migrant or vagrant species such as Tennessee Warbler or Western Wood Pewee.

Occurrences of several common breeding species differed between our survey years (Figure 3). Yellow Warbler occurred about twice as frequently on woodland plots in 2001 than in 1994. In woodland-prairie edge, Cedar Waxwing occurred twice as frequently in 2001 as in 1994, but Eastern Kingbird and Song Sparrow were nearly twice as frequent in 1994. Savannah Sparrow and Bobolink occurred 50-80% more frequently in drift prairie and dense nesting cover in 2001 than in 1994, and Savannah Sparrow also was more frequent in prairie slope in 2001. Clay-colored Sparrow occurred 20-100% more frequently in all habitats in 2001 compared to 1994.

The greatest number of species occurred in woodland-prairie edge and the fewest occurred in dense nesting cover (Table 1). Woodland-prairie edge also had the greatest number of common species, 14, compared to five to eight common species in other habitats (Figure 3). However, most species that were common in woodland-prairie edge also were common in other habitats.

Woodland Species

Least Flycatcher, House Wren, and Yellow Warbler were the most abundant species in woodlands (Table 1). These species also were quite common in the woodland-prairie edge, especially Yellow Warbler. Less common were Veery and Ovenbird, which occupied the most mature woodland stands in deep, broad coulees and along some east-facing slopes. Red-Eyed Vireo was most frequently found in such places, but occurred occasionally in woodland-prairie edge. Gray Catbird, Cedar Waxwing, and Spotted

Towhee generally occurred near edges of relatively young woodland stands, usually in understory shrub especially Chokecherry.

Woodland-Prairie Edge Species

Woodland-prairie edge was the most important habitat of Willow Flycatcher, Song Sparrow, and Brown-headed Cowbird (Table 1). Because many of our detections of Brown-headed Cowbird consisted of single adults of either sex, the species' abundance in edge and open habitats seemed better reflected by its frequency of occurrence: we detected cowbirds on about 40% of survey plots on the woodland-prairie edge (Figure 3), compared with only 3-18% of plots in more open habitats. Song Sparrow typically occupied edge habitat at the bottom of slopes, near water. Willow Flycatcher occurred mainly in extensive tall shrub up to the mid-slope.

Grassland Species

Clay-colored Sparrow was the only species that was common in all upland habitats on DLNWR; it was as abundant in woodland-prairie edge, where tall shrub cover was extensive, as it was in drift prairie where tall shrubs were less prevalent (Table 1, Figure 3). Other grassland bird species occurred in drift prairie, prairie slope, and dense nesting cover habitats. Savannah Sparrow was particularly ubiquitous in drift prairie and dense nesting cover and appeared to avoid woodland edge. Bobolink was common in drift prairie and in dense nesting cover especially where hay had been harvested 1-3 years earlier. Vesper Sparrow and Grasshopper Sparrow were less common than Clay-colored and Savannah sparrows, preferring prairie slope. Sprague's Pipit occurred along several upper prairie slopes and in drift prairie areas that had been prescribe-burned and grazed during the previous 4-5 years. Most detections of the infrequently occurring Baird's Sparrow also were in recently burned and grazed drift prairie. Western Meadowlark was recorded only occasionally, in drift prairie or dense nesting cover. Horned Lark and Killdeer occurred rarely, on recently (< 6 months) prescribe-burned drift prairie. Dense nesting cover was important habitat for Sedge Wren and Le Conte's Sparrow (Table 1).

Discussion

We found that contemporary upland habitats at DLNWR support a varied breeding bird community: 72 upland breeding species, with 5 to 14 species common in each of five major upland habitats. The total number of breeding bird species on the refuge may be nearly twice as great, however, when considering rare to occasional species in uplands in addition to those closely associated with buildings on and adjacent to the refuge (e.g., House Sparrow, Barn Swallow), plus many species of grebes, terns, ducks, rails, and other waterbirds that breed in the marshes and open water impoundments. Although a list of bird species specific to DLNWR has not been compiled since the 1960s, a collective list of birds species occurring on DLNWR and nearby Upper Souris and J. Clark Salyer National Wildlife Refuges indicates that 150 species "nest regularly" on the three refuges.[1]

Between-year Differences

Occurrences of several common bird species differed between our 1994 and 2001 surveys. Increased occurrences of common grassland species - Clay-colored Sparrow, Savannah Sparrow, and Bobolink - likely were associated with concurrent increases in local or regional populations. Average total numbers of these three species increased by 2- to 4-fold on Breeding Bird Survey routes within 100 km of DLNWR between 1994 and 2001.[14] These increases may be linked to increased growth of grassland vegetation from above-average annual precipitation during the period 1994-2000. The attractiveness of native prairie on DLNWR to grassland birds also may have improved due to a general increase in the ratio of herbaceous to woody vegetation as a result of prescribed burns, at least for Bobolink and perhaps Savannah Sparrow.[12] Clay-colored Sparrow abundance typically declines following burning of northern mixed-grass prairie.[9, 12]

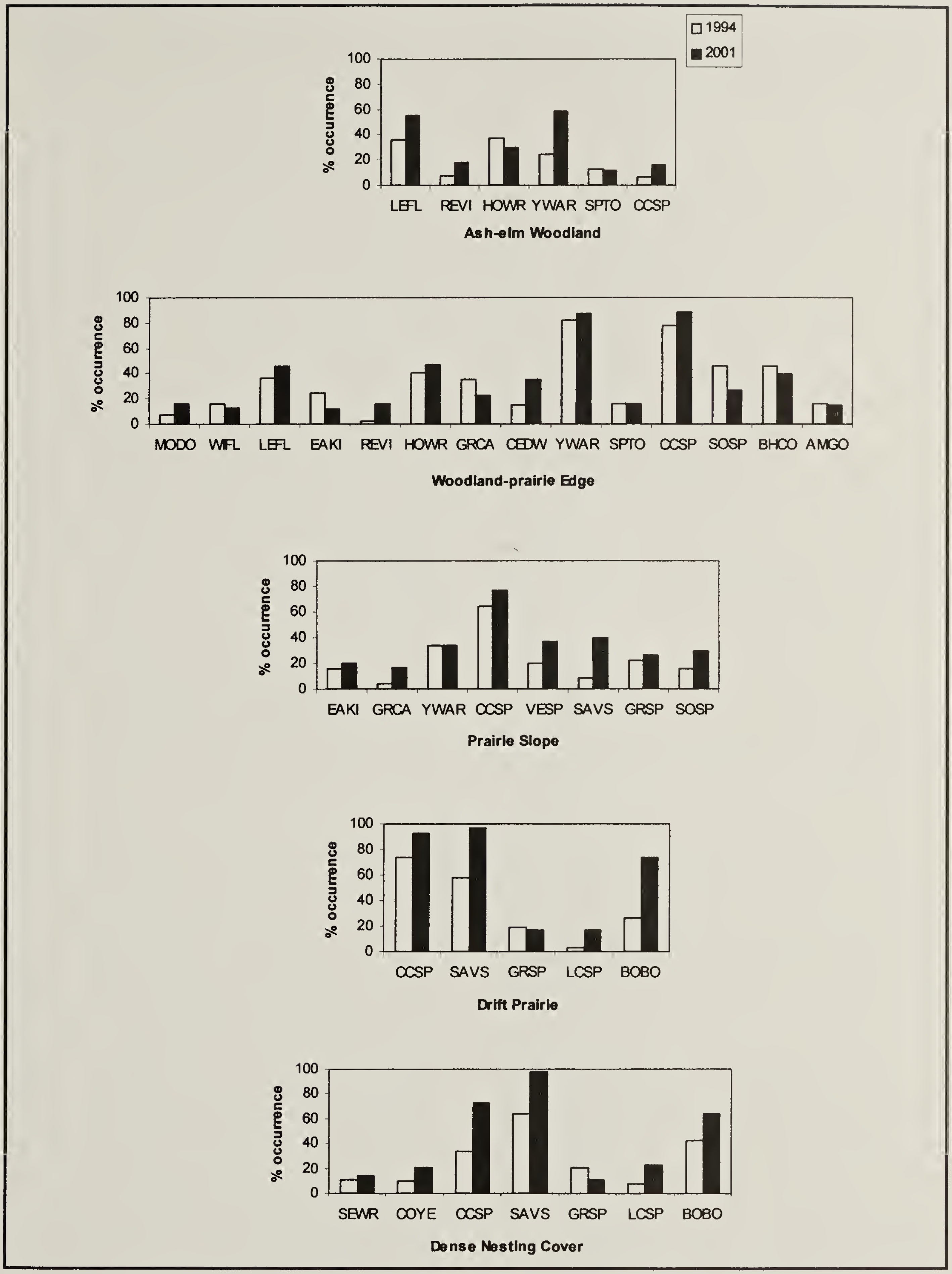

Figure 3. Frequency of occurrence of common breeding bird species in major upland habitats at Des Lacs National Wildlife Refuge, 1994 (white bars) and 2001 (dark bars). Species include American Goldfinch (AMGO), Brown-headed Cowbird (BHCO), Bobolink (BOBO), Clay-colored Sparrow (CCSP), Cedar Waxwing (CEDW), Common Yellowthroat (COYE), Eastern Kingbird (EAKI), Gray Catbird (GRCA), Grasshopper Sparrow (GRSP), House Wren (HOWR), Le Conte's Sparrow (LCSP), Least Flycatcher (LEFL), Mourning Dove (MODO), Red-eyed Vireo (REVI), Savannah Sparrow (SAVS), Sedge Wren (SEWR), Song Sparrow (SOSP), Spotted Towhee (SPTO), Vesper Sparrow (VESP), Willow Flycatcher (WIFL), Yellow Warbler (YEWA).

Breeding birds and habitat: present and past

Most woodland bird species and many woodland-prairie edge bird species that we found probably were rare or absent as breeding species when trees were scarce in the area a century ago,[7] for example: Cooper's Hawk, Hairy Woodpecker, Least Flycatcher, Red-Eyed Vireo, Veery, American Crow, and Baltimore Oriole. Perhaps even Brown-headed Cowbird was much less common in the area before settlement; we found it to be less common in open habitats compared to woodland-prairie edge. In addition, several introduced species such as Ring-necked Pheasant now occur. Thus, species diversity presumably is greater now than it was before the area was settled by peoples of European descent in the late 1800s, and before establishment of the refuge in 1935.

In contrast, the diversity of grassland-dependent bird species has diminished on DLNWR. Although we found several grassland bird species to be quite common (Clay-colored Sparrow, Savannah Sparrow, and Bobolink), most were uncommon and some were absent. Killdeer, Horned Lark, Western Meadowlark, Sprague's Pipit, and Baird's Sparrow are among breeding species considered characteristic of the area's mixed-grass prairie,[5, 15] but they occur infrequently on DLNWR. Chestnut-collared Longspur, another characteristic species, was not detected on DLNWR although we observed it defending breeding territories on adjacent, privately owned tracts of grazed prairie. Burrowing Owl and Ferruginous Hawk also are characteristic, but were not observed during our study and have not been recorded on DLNWR for decades. The community of grassland bird species that are uncommon to absent on DLNWR generally requires shorter, sparser, more herbaceous prairie vegetation than that available on the refuge today.[11] Replacement of native grasses by introduced species, especially Smooth Brome, also reduces the attractiveness of the mixed-grass prairie for several native passerines especially the endemic Baird's Sparrow and Sprague's Pipit.[13] Increases in judicious use of prescribed burning and livestock grazing would provide more suitable habitat for these native species, while still providing habitat for more generalized grassland bird species such as Savannah Sparrow and Clay-colored Sparrow.[12] Regardless of vegetation conditions, some species such as Northern Harrier may avoid narrow tracts of drift prairie bordered by cropland, simply because they need broader grassland tracts;[10] territories of the harrier may cover 100-200 ha.[2] Western Meadowlark has relatively large territories (5-10 ha) for a grassland passerine, but evidence of the species' sensitivity to habitat area is unclear in the northern Great Plains.[10]

Implications for managing habitat

Eleven grassland bird species that occurred at DLNWR during or prior to our survey are included in a 1995 FWS list of "Nongame Birds of Management Concern" (Table 1).[16] Only one woodland species (Veery) and none of the woodland-prairie edge species that we recorded at DLNWR are on the list. Woodland-prairie edge is a widespread habitat type on the refuge that, in the absence of fire, would continue to replace drift prairie and some prairie slope. The only grassland bird species that were common in this habitat were Clay-Colored Sparrow and Brown-headed Cowbird. Woodland bird species that were common in the woodland-prairie edge - Least Flycatcher, House Wren, and Yellow Warbler - are widespread in North America and have stable to increasing populations.[14] Conversion of woodland-prairie edge habitat to drift prairie at DLNWR, through repeated prescribed fire, would negligibly influence continental population trends of woodland bird species while clearly benefitting populations of grassland bird species, which generally are declining. Conversely, mature ash-elm woodland at DLNWR typically occurs in steep, fire-sheltered areas that may be overwhelmingly difficult to restore to prairie. Such areas probably would continue to provide modest habitat for area-sensitive, "forest interior" species such as Veery and Ovenbird without hindering widespread improvement in grassland bird habitat.[6]

Dense nesting cover was planted on DLNWR mainly to provide nesting cover for upland-nesting ducks, but we found that it also increased grassland bird diversity on the refuge by providing important habitat for Sedge Wren and Le Conte's Sparrow. We also detected several Nelson's Sharp-tailed Sparrows in dense nesting cover. These three species typically are associated with wetland margins in the northern plains region, but the rank, coarse cover of introduced grass-forb stands apparently emulates the native wet meadow vegetation that attracts these species.[11] We also often observed Northern Harriers and Short-eared Owls foraging in dense nesting cover; nesting by these species has been noted in dense nesting cover at DLNWR (FWS, unpubl. data).

Conclusions

We documented a varied upland breeding bird community at DLNWR, but one in which native grassland bird diversity has declined. Conservation needs of these grassland bird species are urgent. The total area available on many of the refuge's drift prairie tracts may be inadequate for some species. Suitable habitat could be made widely available for other grassland bird species, however, with moderately aggressive land management, especially expanded use of a combined fire and grazing regime that was beginning to develop at DLNWR during our study. Efforts to improve grassland bird habitat on the refuge coincide with restoration goals for native prairie flora, as might be the case in other prairie river valleys of the northern plains region.

Acknowledgments

We dedicate this paper to the memory of Bob and Ann Gammell, amateur naturalists who contributed greatly to the knowledge and appreciation of birdlife in northwestern North Dakota. Beth Madden provided sound advice on our survey methods. Sharon Anderson and Natalie Fahler helped summarize data. We thank Steve Davis, Todd Grant, Ron Martin, Cory Rubin, Dan Severson, and Karen Smith for helpful discussions and comments surrounding this paper.

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Table 1. Relative abundance of breeding bird species in major upland habitats of Des Lacs National Wildlife Refuge, nw North Dakota, denoted by the average number of detections of indicated pairs per 8-minute point count survey on 30-m radius plots in ash-elm woodland and on 75-m radius plots in other habitats. "X" indicates 0.01-0.05 detections per point count survey.

	Ash-elm woodland		Woodland-prairie edge		Prairie slope		Drift prairie		Dense nesting cover	
	1994	2001	1994	2001	1994	2001	1994	2001	1994	2001
Northern Harrier*[a]							0.1	x	x	0.1
Cooper's Hawk	0.1	x	x	x						
Swainson's Hawk			x	x	x	x	x	x		
Red-tailed Hawk			x	x						
American Kestrel								x		
Gray Partridge								x		x
Sharp-tailed Grouse							x	x		x
Ring-necked Pheasant		x	x							x
Wild Turkey				x						
Killdeer							x	x		
Marbled Godwit								x		
Upland Sandpiper*							x	0.1		
Mourning Dove	x	x	0.1	0.2	x	0.1	x	x		
Black-billed Cuckoo				0.1						
Great Horned Owl	x	x	x	x						

Long-eared Owl	x		x							
Short-eared Owl*							x		x	
Ruby-throated Hummingbird	x									
Northern Flicker			x							
Downy Woodpecker	x									
Hairy Woodpecker	x	x		x						
Eastern Wood-Pewee	x	x								
Willow Flycatcher	x	x	0.2	0.1	x	0.1	x			
Least Flycatcher	0.4	0.7	0.5	0.7	x	0.1				
Western Kingbird	x	x	0.1	0.1	x					
Eastern Kingbird			0.3	0.1	0.2	0.2	0.1	0.1	x	
Warbling Vireo			x	x						
Red-eyed Vireo	0.1	0.2	x	0.2						
Blue Jay				x						
Black-billed Magpie			x	x						
American Crow	x	x	x	x						
Horned Lark							x	x	x	
Tree Swallow	x	x	x	0.1	x					
Black-capped Chickadee	x	x	0.1	x						
White-breasted Nuthatch	x	x	x							
House Wren	0.4	0.3	0.5	0.6	x	0.1	x			
Sedge Wren*			x	x			x	x	0.1	0.3
Veery*	x	x	x							
American Robin	x	x	x	x						

	Ash-elm woodland		Woodland-prairie edge		Prairie slope		Drift prairie		Dense nesting cover	
	1994	2001	1994	2001	1994	2001	1994	2001	1994	2001
Mountain Bluebird							x			
Gray Catbird	x	x	0.4	0.2	x	0.2	x			
Brown Thrasher			0.1	0.1	0.1	x				
European Starling			x							
Sprague's Pipit*			x		0.1	0.1	0.1	0.1		
Cedar Waxwing	0.1	0.1	0.2	0.4	0.1	x	x	x		
Yellow Warbler	0.3	0.6	1.4	1.7	0.4	0.4	0.1	0.1		
Black-and-white Warbler	x	x	x	x	x	x				
American Redstart	x	x								
Ovenbird	x	x	x							
Common Yellowthroat			0.1	x	x		0.1	0.1	0.2	0.2
Yellow-breasted Chat			x							
Spotted Towhee	0.2	0.1	0.2	0.2	x	x	x			
Field Sparrow				x						
Clay-colored Sparrow	0.1	0.2	1.7	1.8	1.0	1.1	1.5	2.2	0.5	1.4
Lark Sparrow			x							
Vesper Sparrow			x	0.1	0.2	0.4	x	0.1	x	x
Savannah Sparrow			0.1	0.1	0.1	0.5	0.8	2.0	1.0	2.7
Grasshopper Sparrow*			0.1	x	0.4	0.3	0.3	0.2	0.3	0.1

Baird's Sparrow*							x	0.1	x	
Le Conte's Sparrow							x	0.2	0.1	0.3
Nelson's Sharp-tailed Sparrow					x				x	0.1
Song Sparrow	x	x	0.5	0.3	0.2	0.3	x		x	
Rose-breasted Grosbeak	x	x								
Black-headed Grosbeak	x									
Bobolink*			x	0.1		x	0.3	1.2	0.6	1.2
Red-winged Blackbird				x			x	0.1	x	
Western Meadowlark			x	x		x	0.1	x	0.1	
Brewer's Blackbird			0.1	0.1			0.1	0.1		
Brown-headed Cowbird	0.1	0.1	0.5	0.3	x		0.1	0.1		x
Orchard Oriole			0.1	0.1						
Baltimore Oriole	x	x	0.1	0.1	x	x				
American Goldfinch	x	x	0.2	0.2	x	x	x	x		
No. plots surveyed	94	43	128	68	45	30	146	58	62	48
No. species[b]	34		53		27		35		21	

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[a] Asterisk denotes FWS species of management concern.[16] Other species of concern recorded historically as upland breeding birds at Des Lacs National Wildlife Refuge (FWS, unpubl. refuge data) but not during 1994 and 2001 surveys are Ferruginous Hawk, Burrowing Owl, and Chestnut-collared Longspur .

[b] Total detected during 1994 and 2001 combined.

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RURAL BANDERS IN THE YORKTON AREA*

C. STUART HOUSTON, 863 University Drive, Saskatoon, SK S7N 0J8

Of the six early banders active within the Yorkton - Duck Mountain (YDM) bird area, Judge J.A.M. Patrick, who banded from 1929 to 1933, was the first.[2] In 1937, Bill and Lindsay Wotherspoon banded 885 birds of 42 species, with 12 recoveries, in the village of Hyas and on their farm on the north side of that village.[1] Three "outside" banders visited the YDM area in the 1940s: Fred Bard, of the Saskatchewan Natural History Museum, released 11 banded magpies and 13 crows as part of his crow and magpie campaign.[3] R. Lorne Scott banded 19 Great Horned Owls, 19 Red-tailed Hawks, 6 Black-billed Magpies, 756 Tree Swallows and 425 Mountain Bluebirds along his bird box trail on Highway 35, within the western boundary of the YDM area.[4] J.A. Briggs of Regina banded 126 birds of 11 species, including 63 flickers and 7 Brewer's Blackbirds, as he inspected the Canadian National Railways track near Melville.[5] Two additional banders, Robert Blakeley and Emma Wickencamp, who lived only about 10 km apart between Canora and Sturgis, are the topic of this brief report.

Robert Maurice Blakeley, banding permit 00164, grew up on a farm near Tadmore, where much of his banding was done in 1929. At a farm near Wishart barely within the western boundary of the Yorkton - Duck Mountain area, and near Canora other birds were banded: Yellow-shafted Flickers, Barn Swallows and Loggerhead Shrikes. He paid a holiday visit to Carlyle Lake on 11 July where he banded two young Red-necked Grebes. From 13 to 15 August, he operated a home-made funnel trap at a slough edge near Canora where he caught four Killdeer, two Wilson's Snipe, two Solitary Sandpipers and one each of Pectoral and Least sandpipers. Vesper and Song sparrows were banded in their nests, as were American Robins, which used a variety of nest sites: a farm binder, a road bridge, a school, the railroad bridge at Sturgis, and an unspecified site in the town of Canora. His Saskatchewan banding totaled 82 individuals of 18 species.

Blakeley attended the Manitoba Agricultural College from 1931 to 1933, and had summer employment at the Morden Experimental Farm in Manitoba in 1931 and 1932, where 40 individuals of 4 species were banded, including 29 American Robins.

He had two Texas recoveries, one in October 1929 and one in February 1932, from three Red-tailed Hawks banded on the farm at Tadmore on 13 June 1929.

Mrs. Emma Wickencamp, banding permit 00285, was a rural school teacher before she married Frank Wickencamp, whose family had moved from Nebraska in 1920 to buy the northwest quarter of section 31, township 33, range 3. Their farm home was on the "back road" from Sturgis to Crystal Lake, adjacent to a beautiful, small lake, 1.5 km south and 3 km west of Stenen. Emma banded birds from 1933 through 1939, banded no birds in 1940 and gave up her permit in April 1941. She died in 1969, ten years after they had left their farm.

She banded 207 individuals of 28 species. From these she had a prodigious nine recoveries: a Red-tailed Hawk shot at Buffalo Bayou, Texas, in its first migration south; the only Mallard she banded was shot at LaFleche, Saskatchewan the next year; three of eight Brewer's Blackbirds were recovered locally the same year and a fourth was shot with a slingshot by a farm lad near Canora in May two years later; an American Robin, a Downy Woodpecker, and a Black-capped Chickadee were found locally.

Acknowledgements

I thank Pat Armstrong of Sturgis (now in Saskatoon) and Richard Wickencamp of Edmonton, for personal information.

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* Number 21 in a series of biographies of Saskatchewan bird banders

PLANTS

UPDATE ON THE DISTRIBUTION OF BUFFALOGRASS IN SOUTHWESTERN MANITOBA

ELIZABETH REIMER, CARY HAMEL and MARILENA KOWALCHUK
Manitoba Conservation Data Centre, Box 24, 200 Saulteaux Crescent, Winnipeg, MB R3J 3W3

Introduction

In Manitoba's Souris River Valley, Buffalograss (*Buchloë dactyloides*) stolons creep over and around the stones of a long-abandoned tipi ring. The sight draws the imagination back to a time when large herds of American Bison migrated through the valley, feeding on the abundant grasses. Buffalograss is uniquely adapted to coexist with bison; the unusual bur-like seed structures stick to their long shaggy fur, making bison unwitting participants in seed dispersal, and grazing itself is beneficial to many grasses, including Buffalograss. Some speculate that Buffalograss could not survive at its northern limit of distribution in

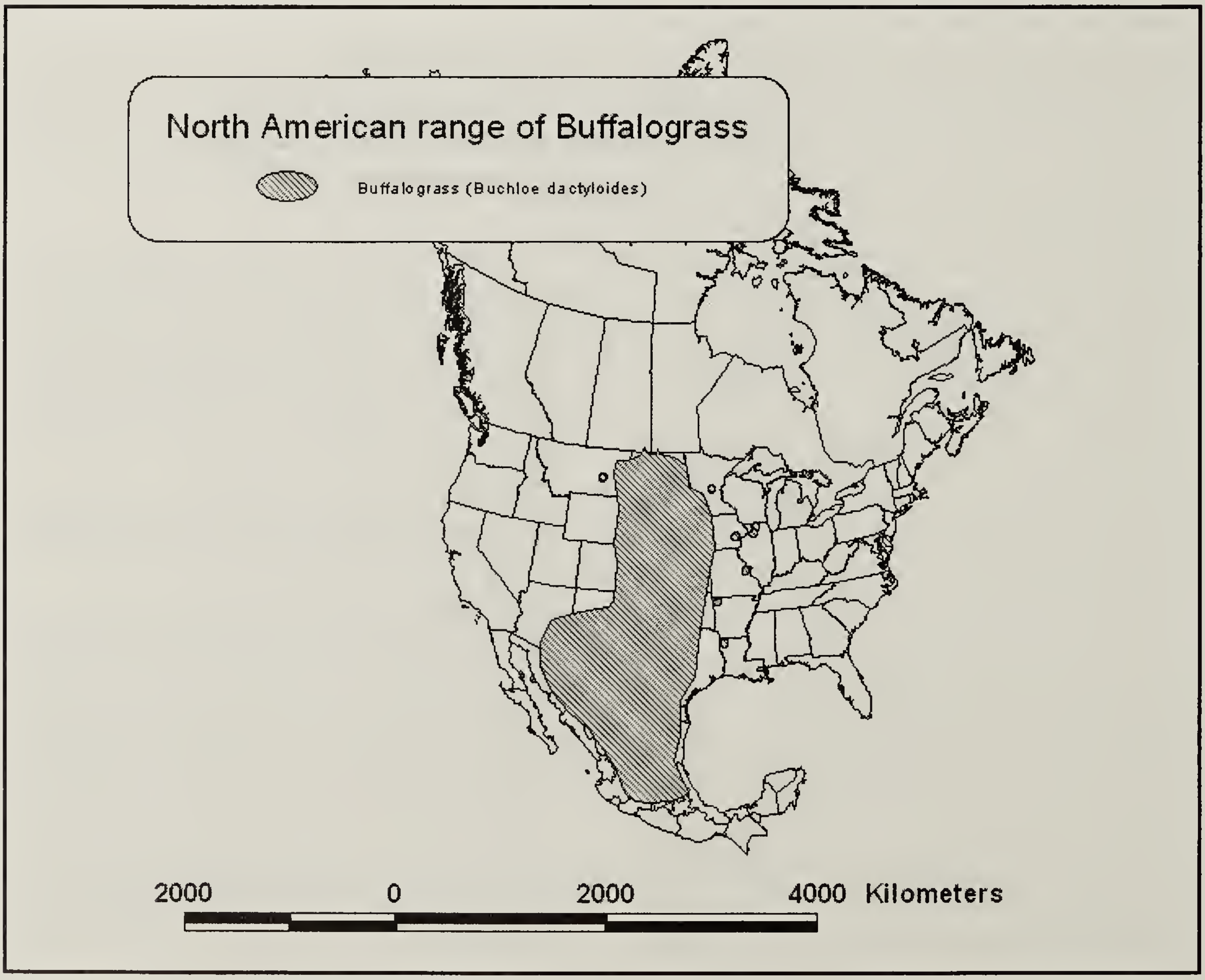
North American range of Buffalograss
▨ Buffalograss (Buchloe dactyloides)
2000
0
2000
4000 Kilometers

Figure 1. Range of Buffalograss (Buchloë dactyloides) in North America, from Harms 1997.

Saskatchewan and Manitoba (Figure 1) without grazers to trim the taller plants that block out the sun for diminutive species like Buffalograss. [4] Though bison no longer dominate the landscape, the cattle and horses that graze in the Souris River Valley have now taken on the role of maintaining Canadian populations of this plant.

Buffalograss is usually dioecious, that is with male and female flowers occurring on separate plants. Both sexes are occasionally found on the same clone in more southerly parts of the species' range. [4] Several male spikes occur atop slender culms that reach up to 12 cm tall. The shorter, female flowering stems rarely grow taller than 5 cm, and the spikes are concealed within the expanded sheaths of the upper leaves. [1] The hardened glumes of the female spikelets form a bur-like cluster (Figure 2) that detaches from the plant intact. Each cluster typically contains three to five seeds, and has the potential to produce some male and some female plants. [4] The plant also reproduces asexually via stolons that spread on the surface, producing clones that can grow to 3 m or more in diameter. [4] Buffalograss forms a dense sod in areas where clones crowd together. The spreading nature of Buffalograss helps to anchor soil, and it has been planted in roadside cuts to reduce soil erosion. [7] It can also be used as a low-maintenance lawn grass. It is highly tolerant of drought, and valuable as winter forage for its high nutrient retention. In the American Midwest, Buffalograss sod was used to build houses in the early days of European settlement. [4]

Some farmers in the Coulter area call Buffalograss "prairie wool", although in other parts of the Prairie Provinces this term may refer to Rough fescue (*Festuca hallii*). The curled leaves that likely inspired the local moniker also lend Buffalograss, especially the male clones, a superficial resemblance to Blue Grama (*Bouteloua gracilis*). [1] Blue Grama lacks stolons and possesses scaly rhizomes, and is generally taller than Buffalograss. [4]

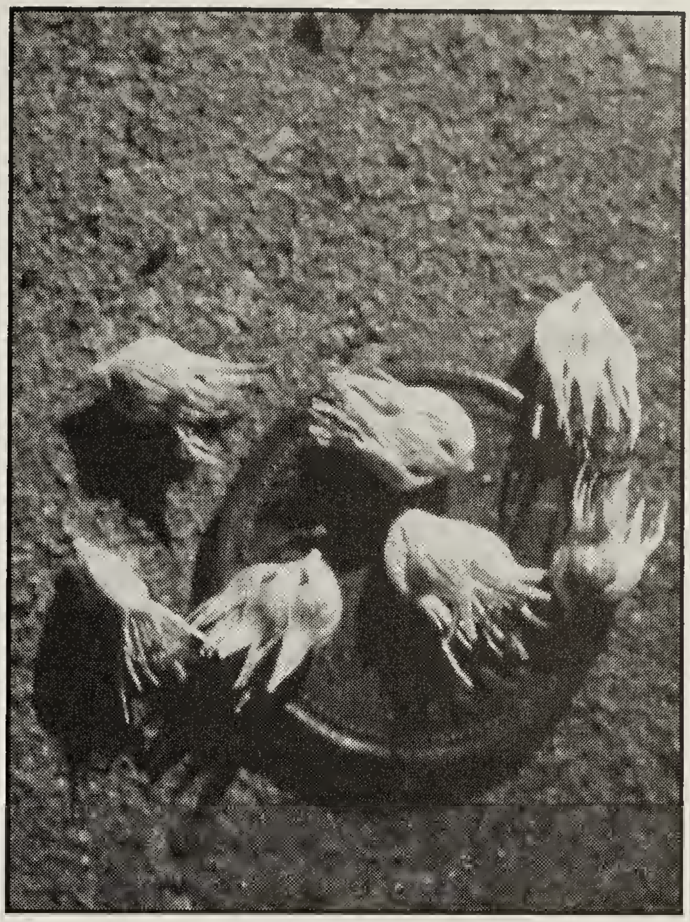

Figure 2. Bur-like clusters of buffalograss seed shown on a penny for scale.

Status

Buffalograss, listed as Vulnerable by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) in 1998, was uplisted to Threatened in 2001 based on a re-assessment using new, quantitative criteria. A species is ranked Threatened in the absence of demonstrated continuing decline if its area of occupancy is less than 20 km^2, or if it occurs at fewer than five locations, as Buffalograss does. (A species with area of occupancy less than 500 km^2, and extent of occurrence less than 5000 km^2 is considered Endangered when continuing decline is observed or inferred.) In Manitoba, Buffalograss was not found within any protected areas, and all occurrences were found on privately owned land. The rarity of Buffalograss in Canada may reflect poor growing conditions at the northern edge of its range, or the species may be rare because of the widespread cultivation of native prairie in the early 20th century. Buffalograss may have existed elsewhere before the advent of farming in Canada, in areas that are now cultivated.

Although Buffalograss is rare at the periphery of its range in Canada and Minnesota, elsewhere it is an important component of the mixed-grass prairie and forms the dominant cover in parts of the west central Great Plains. [4] NatureServe considers this species secure globally. [6]

The rarity of Buffalograss in Manitoba made it a priority for examination by Manitoba's Endangered Species Advisory Committee. This survey of native prairie in the Souris River Valley in southwestern Manitoba was conducted to collect current and complete information on the distribution and habitat preferences of Buffalograss. The survey was a partnership between the Manitoba Conservation Data Centre (CDC) and the Critical Wildlife Habitat Program's Mixed Grass Prairie Inventory project, which was initiated in 1996 to identify the extent and quality of remaining mixed-grass prairie in Manitoba. Two other species considered rare (Baird's Sparrow, listed as Endangered by Manitoba's *Endangered Species Act*, and Sprague's Pipit, designated as Threatened by COSEWIC) were observed as part of the survey.

Methods

Site description

The Souris River enters Manitoba from North Dakota, and runs almost straight north to Melita before it curves eastward towards the town of Souris (Figure 3). The Souris and Blind rivers have deposited clay on the treeless floodplain south of Melita, and this is where Buffalograss grows (Figure 4).

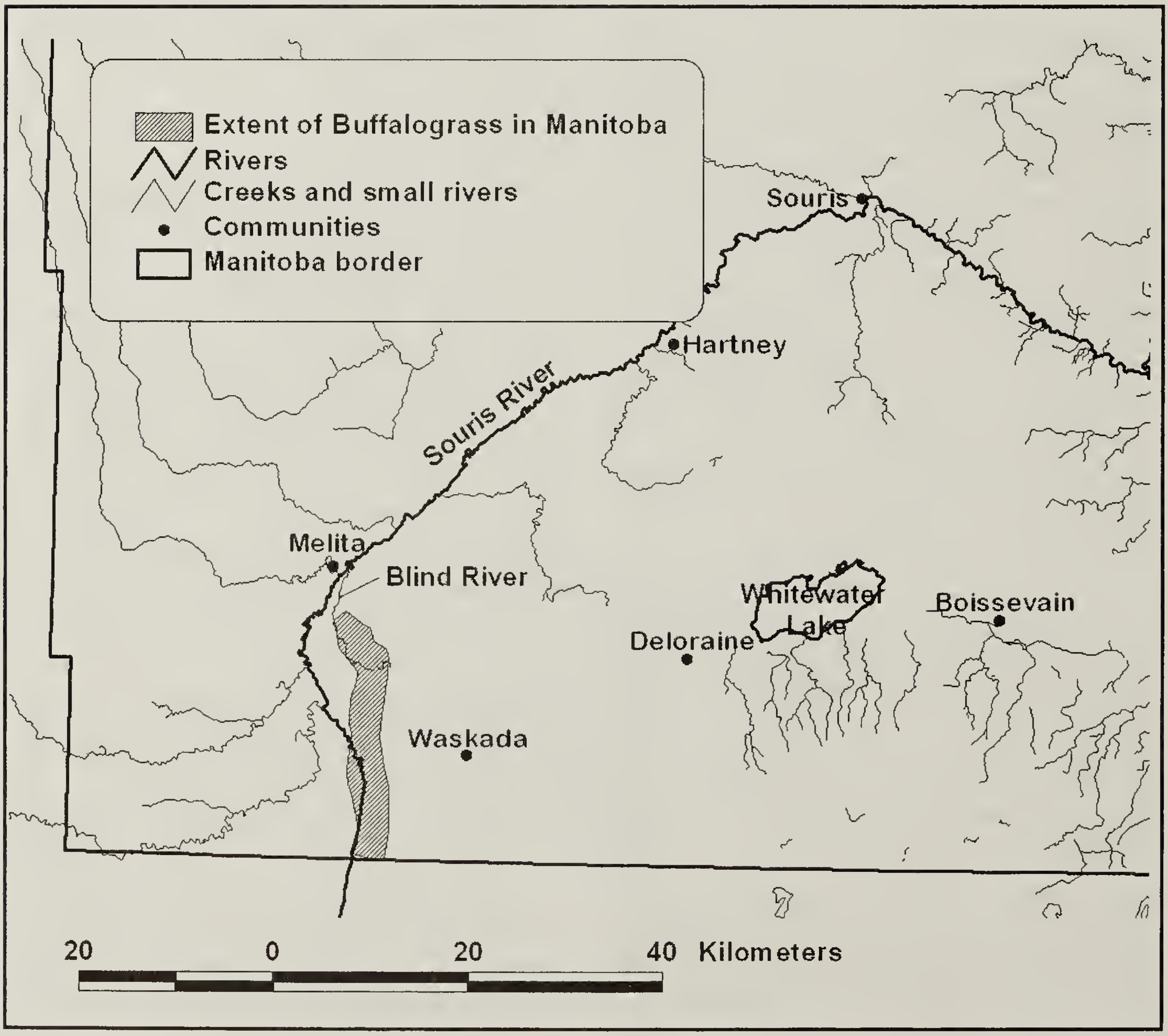

Figure 3. The extent of Buffalograss in Manitoba. The species occurs discontinuously within the shaded area.

Alkaline flats are scattered throughout the valley bottom, often evident from the white crust on top of the soil. These areas are dominated by Inland Salt Grass (*Distichlis stricta*), and Buffalograss does not grow where alkaline deposits occur. From the Souris River, the elevation rises in a series of terraces and slopes carved by coulees and blanketed with grasses and wildflowers. Above the valley, most of the land is cultivated and sown to annual crops.

Survey Methods

Potential native prairie sites were identified using forest resource inventory maps, Landsat TM satellite imagery, and digital aerial photos. Prior to the survey, landowners were contacted by mail or telephone to request permission to access their property. The survey was conducted on foot between June 5 and July 29, 2002. On each quarter section surveyed, CDC staff recorded the extent of each patch of Buffalograss on an aerial photo. The data were digitized based on ortho photos (Linnet Geomatics) and entered into the CDC database using the Biotics 3.1 Geographic Information System application. Survey results were provided to all landowners who expressed an interest, as was a list of vascular plants observed on their property and information on Buffalograss, Sprague's pipit and the Manitoba Habitat Heritage Corporation's (MHHC) conservation agreement program.

Results

All Buffalograss occurrences in Manitoba were contained within an area approximately 61 km^2 (Figure 3). It was observed on 42 quarter sections, all within the Rural Municipality of Arthur. Although Buffalograss habitat occurred along the Souris River and Blind River valleys in a band roughly 2 km wide and 25 km long, the distribution of Buffalograss within this area was not continuous; Buffalograss covered only 2.7 km^2. Buffalograss was most abundant in lower slope positions. Within the area occupied, it represented between 20 and 80 percent of the ground cover. Characteristic species associated with Buffalograss in the Souris River Valley included Western Wheatgrass (*Agropyron smithii*), Kentucky Bluegrass (*Poa pratensis*), Needle and Thread (*Stipa comata*), Curlycup Gumweed (*Grindelia squarrosa*), Prairie Sagewort (*Artemisia frigida*), Foxtail Barley (*Hordeum jubatum*), Blue Grama (*Bouteloua gracilis*), Inland Salt Grass (*Distichlis stricta*), and Alkali Cordgrass (*Spartina gracilis*).

Discussion

In 1997, Harms estimated the population of Buffalograss in Manitoba to be 4,858 clones by extrapolation based on the total areal extent of Buffalograss and the average area that a single clone covered. [4] Using the same method of extrapolation that Harms used, the population in Manitoba was estimated to be between 220,000 and 860,000 clones. It is unlikely that Buffalograss has expanded its range since research was conducted for the COSEWIC report in 1997; therefore, this apparent increase likely reflects the fact that this survey covered a larger territory.

The area of occupancy, 2.7 km^2, remains well below the threshold indicated by COSEWIC's quantitative criteria for threatened species. This additional information on the distribution of Buffalograss does not likely warrant a change in its status. Further surveys of mixed-grass prairie in Manitoba are unlikely to result in additional occurrences, because the preferred habitat and soil type are restricted to the study area. The Mixed Grass Prairie Inventory project has conducted surveys of prairie throughout southwestern Manitoba, and Buffalograss has never been observed outside of the range reported here.

In Manitoba, Buffalograss appears to be restricted to a specific soil type characterized by shallow clay to clay loam alluvial deposits over marine shale bedrock. This soil type has a severely limited capability for crop production because of undesirable soil structure, low permeability, and the presence of soluble salts; [2] therefore, threats from cultivation are likely minimal. In other parts of its range, Buffalograss tolerates a wide range of soil conditions, but prefers clay or clay loam soils.[7]

Potential threats to buffalograss populations

Buffalograss is threatened by the encroachment of non-native species like Kentucky Bluegrass (*Poa pratensis*) and Leafy Spurge (*Euphorbia esula*). Dams can flood the habitat of Buffalograss; one such dam, Dam 357 on the Souris River, can be seen just south of the Canadian border in North Dakota. Buffalograss may require moderate to heavy grazing to remove competing grasses and forbs,[4] but grazing must be managed carefully to minimize the negative effects of heavy grazing on mixed grass prairie. Overgrazing increases the amount of bare ground and allows species like Curlycup Gumweed and Prairie Sagewort which are not palatable to cattle, to increase in abundance.[5] Newly exposed bare ground also provides a fertile seedbed for invasive species, including non-native species like Leafy Spurge which may become established and spread to other areas. Avoiding early and late season grazing could help improve the quality of native prairie.[5]

Conclusions

There is a need for basic inventories to catalog remaining natural areas, as these provide habitat for rare species. This information is important for the preparation of recovery plans, and to make informed decisions on the status of this species. Continuing sound stewardship of remnant prairie in the Souris River Valley is important to maintain critical habitat for Buffalograss and other rare species.

Acknowledgements

This project would not have been possible without cooperation among many agencies and individuals. The Habitat Stewardship Program, Manitoba Special Conservation Fund, and the Critical Wildlife Habitat Program (a program delivered co-operatively by the Wildlife and Ecosystem Protection Branch and MHHC) provided funding for this survey. Manitoba Conservation staff provided support, especially Jim Duncan, Jason Greenall, Peggy Westhorpe, and Ken De Smet. Kyle Cannon provided field assistance as part of the Rural Green Team. A special thanks to the many landowners in the Souris and Blind River Valleys who provided access to their lands and whose stewardship has allowed Buffalograss and other rare species to persist in the Souris River Valley. The authors thank Prairie Mountain Roots of Arcola, SK for providing the seeds shown in Figure 2, and Anna Leighton for providing the photograph.

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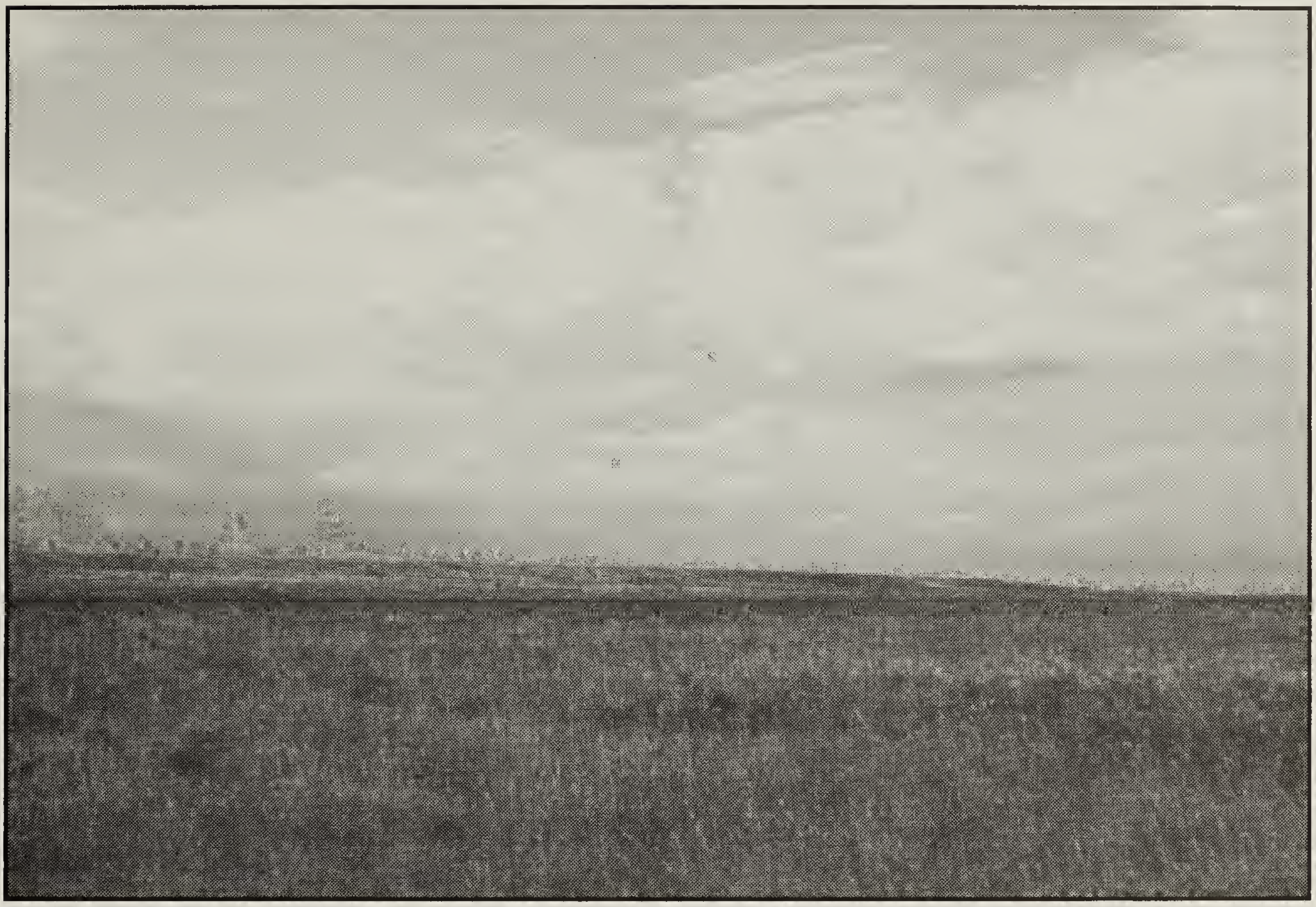

Figure 4. Buffalograss habitat in the Souris River Valley.

* * *

"This morning, when I had been lying for a long time on a rock near the sea watching some hooded crows that were dropping shellfish on the rocks to break them, I saw one bird that had a large white object which it was dropping continually without any result. I got some stones and tried to drive it off when the thing had fallen, but several times the bird was too quick for me and made off with it before I could get down to him. At last, however, I dropped a stone almost on top of him and he flew away. I clambered down hastily, and found to my amazement a worn golf-ball. No doubt it had been brought out in some way or other from the links in County Clare, which are not far off, and the bird had been trying half the morning to break it."

- J.M. Synge. 1901. The Aran Islands, part IV.

MAMMALS

BUSHY-TAILED WOODRATS AND OTHER SMALL MAMMALS IN BIRD PELLETS FROM GRASSLANDS NATIONAL PARK, SASKATCHEWAN

D.B. (Tim) SCHOWALTER, Department of Biology, University of Regina, Regina, SK S4S 0A2, PAT FARGEY, Grasslands National Park, Box 150, Val Marie, SK S0N 2T0, and BRIAN SPREADBURY, Grasslands National Park, Box 150, Val Marie, SK S0N 2T0

Bushy-tailed Woodrat accepting an offering of peanuts at Cadomin Cave, Alberta. The animals are common in the mountains of that province. ***Tim Schowalter***

Recently, Grasslands National Park (hereafter "GNP") staff have carried out or supported studies of small mammals related to endangered species and grassland management.[4,6,7] In addition to other interesting results, those studies found two species of potential conservation concern, Sagebrush Voles and Olive-backed Pocket Mice, to be comparatively common in GNP (scientific names of mammal species are given in Table 1). In this study, we identified prey remains in Great Horned Owl and other bird species pellets collected in and near GNP to learn more about the occurrence of small mammals in the region.

Methods

Pellet collections were made within or in the immediate vicinity of the East and West Blocks of GNP (Figure 1). Land use in the region is primarily cattle ranching and dry land farming with pockets of irrigated hay land in the Frenchman River valley. Irrigation and cattle grazing has been ended on land acquired by Parks Canada. GNP has been acquiring land on a willing seller – willing buyer basis since 1984 and currently owns a little over half of the proposed final park area of 906.5 km^2.

The park is in the mixed-grassland prairie ecoregion in SW Saskatchewan. The climate is semi-arid with short hot summers and long cold winters. Periods of intense drought have occurred. Total annual precipitation ranges from 250 to 350 mm and the elevation ranges from 747 to 1044 m. The landscape includes rolling upland prairie, extensive coulees which are often wooded in their higher reaches, eroded badland complexes, the Frenchman River and several ephemeral streams, wide valley grasslands and shrub lands, and large Black-tailed Prairie Dog (*Cynomys ludovicianus*) colonies.

In September 2000, we searched for pellets in old buildings and at other locations where owls had recently been seen roosting. Pellets were collected as site composite samples at five sites in or near GNP (Table 1, Figure 1). The two Lochart collection sites are near the western boundary of the GNP's East Block, while the Gergovia, Tantor and South Gillespie sites are within the GNP West block. Because of the occurrence of a woodrat in the September 2000 collection at the South Gillespie homestead, the remaining building left at the site was searched again in May 2002 and additional pellets collected and analyzed.

The majority of the pellets were large and otherwise similar to Great Horned Owl pellets collected at other sites in Saskatchewan and Alberta (Schowalter, pers. obs.). Pellets collected from the Gergovia and Tantor homesteads were in buildings and are probably exclusively from Great Horned Owls. Pellets obtained from the Lochart yard, Lochart Dam, and South Gillespie homestead sites were from outdoor roosts and can not be ascribed to a particular bird species. While collecting pellets, we observed Long-eared Owls and Prairie Falcons at the Lochart Yard site. As well, Pat Fargey observed Great Horned Owls there during the summer of 2000. Some of the pellets collected at the Lochart Yard site were similar to raven pellets, but considerably smaller, and may have been cast by American Crows or Black-billed Magpies. Ferruginous and Swainson's hawks both occur in the area of the yard and may also have contributed pellets.

Pellets were carefully picked apart by hand under a magnifying lens. Identifiable elements were set aside for later identification. Pellets with unidentifiable shrew remains were washed, dried, and re-examined in an effort to recover diagnostic parts. Small mammal jaws were identified by Tim Schowalter by examining the teeth under a dissecting microscope, usually at 30x magnification. Prairie Shrews are very similar to Masked Shrews (*Sorex cinereus*). Identification of the former was based upon the positions of the infraorbital and lacrimal foramina, supported by the presence of comparatively large, heavily pigmented teeth.[13]

Two species of *Peromyscus*, the Deer Mouse (*P. maniculatus*) and the White-footed Mouse (*P. leucopus*) are reported to occur in the GNP region.[1,2] Their skulls are very similar and cannot usually be identified from remains in bird pellets where they are usually separated into individual bones. Because of that, we identified these mice as the genus "*Peromyscus*."

Counts of animals were based upon the minimum number represented in each pellet. For small species, including woodrats, the jaws were counted. Left and right mandibles of each species were matched and the number of pairs plus the number of unmatched jaws was determined to be the number of individuals of the species in the pellet. For larger animals, including muskrats, rabbits and hares, identifiable portions of an animal

Table 1. Number of individual mammals identified from bird pellets in the area of Grasslands National Park, Saskatchewan.

	Location						
Species	Tantor NW 28-2-11 W3	Gergovia SE 4-3-11 W3	Lochart Dam NE 21-1-7 W3	Lochart Yard SE 21-1-7 W3	South Gillespie SE 9-1-10 W3 Sept 2000	South Gillespie May 2002	**Total**
Prairie Shrew (*Sorex haydeni*)	10						10
Shrew sp.	5		1	3			9
Hoary Bat (*Lasiurus cinereus*)			1				1
Snowshoe Hare (*Lepus americanus*)	7						7
White-tailed Jackrabbit (*Lepus townsendii*)	1	1					2
Hare species	7						7
Nuttall's Cottontail (*Sylvilagus nuttallii*)	6	1	1	1		4	13
Rabbit or Hare	3	1				2	6
Richardson's Ground Squirrel (*Spermophilus richardsonii*)			6				6
Northern Pocket Gopher (*Thomomys talpoides*)	3					7	10
Olive-backed Pocket Mouse (*Perognathus fasciatus*)	13	5	3	7	2	3	33
Peromyscus sp.	135	11	41	13	3	5	208
Northern Grasshopper Mouse (*Onychomys leucogaster*)		1					1
Bushy-tailed Woodrat (*Neotoma cinerea*)					1	4	5
Meadow Vole (*Microtus pennsylvanicus*)	28	2	1	9		3	43
Sagebrush Vole (*Lemmiscus curtatus*)	23	7	5	9			44
Muskrat (*Ondatra zibethicus*)	10	1	1	1			13
House Mouse (*Mus musculus*)			3	17			20
Western Jumping Mouse (*Zapus princeps*)	2						2
Total	253	30	63	60	6	28	440

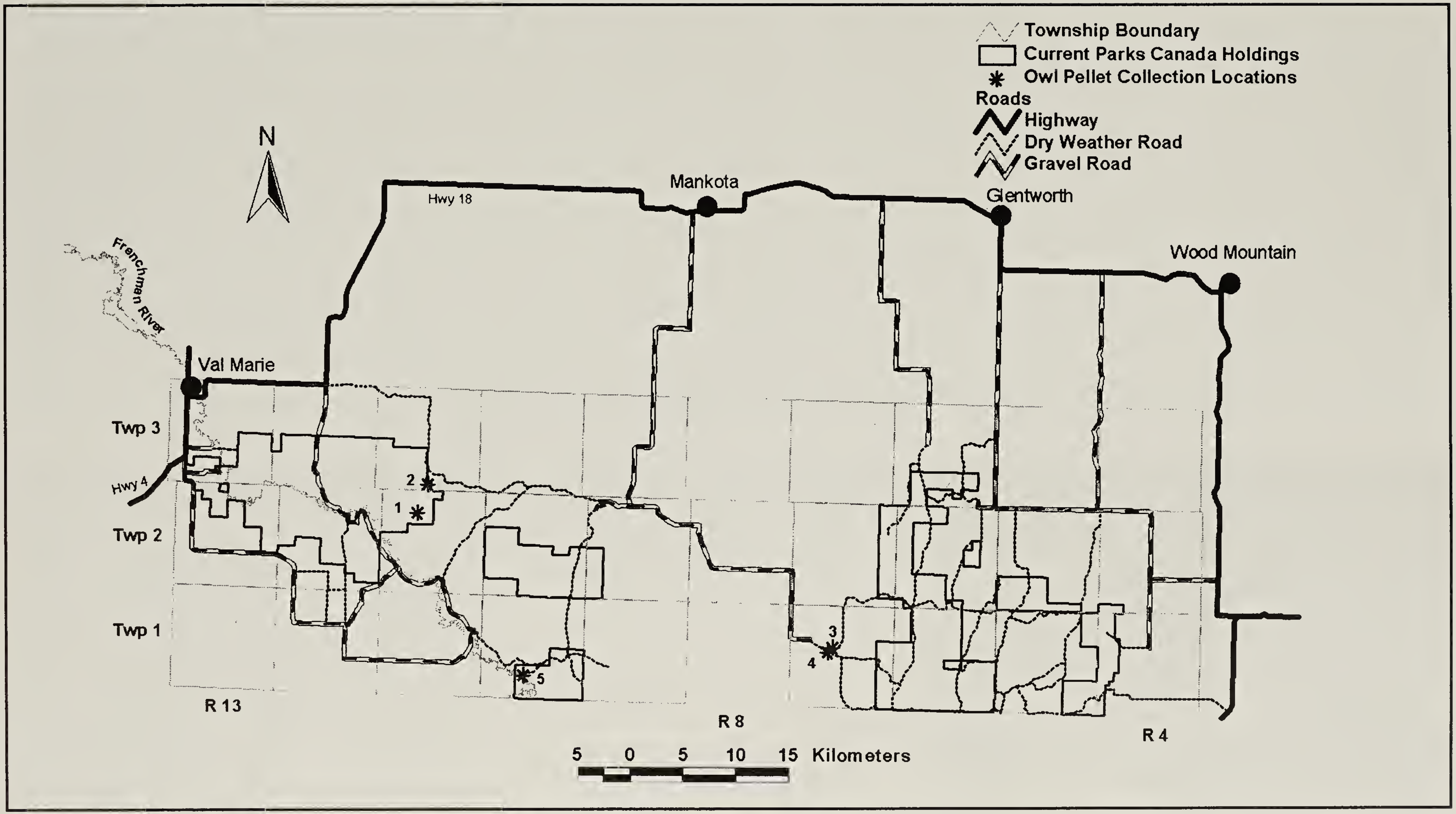

Figure 1. Bird pellet collection sites in and near Grasslands National Park, SK. Site names are: 1- Tantor, 2 - Gergovia, 3 - Lochart Dam, 4 - Lochart Yard, and 5 - South Gillespie.

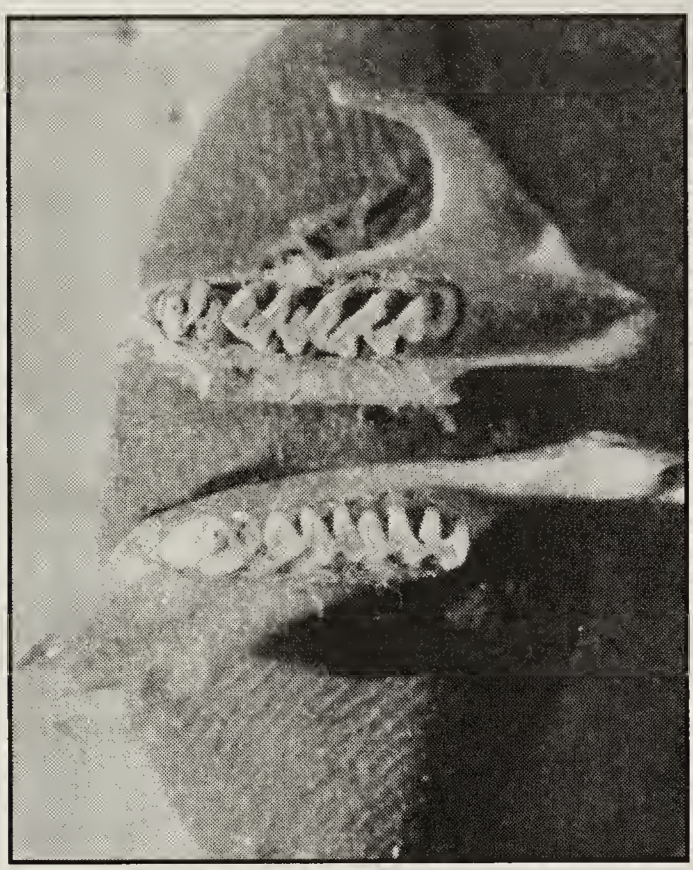

Figure 2. Upper (top) and lower (bottom) jaws of at subadult Bushy-tailed Woodrat (RSM 17907) from the South Gillespie site, Grasslands National Park. /Tim Schowalter

in a pellet were counted as one animal of a species unless there was duplication of bones that demonstrated that more than one individual was represented. The material recovered from pellets collected during this study has been incorporated into the collections of the Royal Saskatchewan Museum in Regina.

Results and Discussion

Counting "*Peromyscus*" as only one species, we identified 16 mammal species in the bird pellets (Table 1). Several interesting specimens were found and are discussed below.

Bushy-tailed Woodrat

Remains of a Bushy-tailed Woodrat (also known as "packrat") were found in a pellet collected at the South Gillespie site (49°01' N 107°17' W) in GNP in September 2000. The remains represent the second specimen record of the species in Saskatchewan. The previous record of a Bushy-tailed Woodrat in the province is one taken in a basement in Govenlock in 1950 in the extreme southwest of the province.[8] The animal from the South Gillespie site is a subadult with the third molars just starting to show wear (Figure 2). Bones of the woodrat have been deposited in the Royal Saskatchewan Museum as RSM 17907. The species of bird which cast the pellet is not known; however, the pellet was of a similar size to Great Horned Owl pellets collected at other locations.

Subsequent to the initial discovery of the woodrat remains in the pellet, conversations with park staff revealed that woodrats had been known at the South Gillespie site since approximately 1991. The animals had built a large nest in the old Quonset barn that used to be at the site. Leon Perrault reports a particularly memorable observation of approximately six of the animals when he, Dennis Madsen, Rob Watson, and Keith Foster were burying an old garbage dump at the site.

In addition to the pellet collected in September 2000, six of the Great Horned Owl pellets collected in the one remaining building at the site in May 2002 contained woodrat remains representing a minimum of four individuals based upon the number of jaws present. The floor of the valley at the South Gillespie site is predominately native vegetation though areas near the old buildings have considerable Smooth Brome (*Bromus inermis*) and Crested Wheatgrass (*Agropyron cristatum*). The banks of the valley in the area of the site vary from densely covered grassy slopes to nearly unvegetated badlands. Bushy-tailed Woodrats are not well adapted to the summer heat of prairie river valleys and depend upon crevasses or other locations that allow them to remain cool during hot weather.[3,11] The badlands near the South Gillespie site likely have crevasses that allow the animals to persist in the area.

Bushy-tailed woodrats are native to mountainous regions over much of western North America.[1] In Montana and Alberta, Bushy-tailed Woodrats also occur widely in arid river valleys. [3,5,12] Woodrats are known from Phillips County adjacent to GNP in Montana.[3] As the South Gillespie Site is just over 2 km from the Montana border, it is possible that these animals represent the northern part of a population that lives along the Frenchman River in that state. Woodrats have recently been found along the South Saskatchewan River in Alberta less than 15 km from the Saskatchewan border near Leader.[5] Residents in, and visitors to, that and other river valleys in southwestern Saskatchewan should be aware of the possibility that woodrats may be encountered, particularly in areas that have crevasses that might provide shelter for the animals. Records of observations of woodrats would be of great value in determining the distribution and status of the animals in Saskatchewan.

Hoary Bat

The remains of a Hoary Bat were recovered from a pellet cast by an unknown bird species at the Lochart Dam site. Hoary Bats occur widely in Saskatchewan[10] and the individual may have either been a summer resident or a migrant passing through. The specimen is the first record for GNP.

Northern Pocket Gopher

The remains of three Northern Pocket Gophers were identified from the Tantor site which is adjacent to cultivated land. The remains of seven more were recovered from pellets collected in May 2002 at the South Gillespie homestead. Pocket gophers are frequently taken in considerable numbers by Great Horned Owls elsewhere (Schowalter, pers. obs.). While we have seen the characteristic mounds made by the animals in GNP, they occur in scattered clusters and in limited numbers. For example, pocket gopher mounds were found in only a few places with loose soil in the banks of the larger gullies in the area of the South Gillespie site in May 2002. The small number of specimens in the pellets reinforces the impression that the animals are not generally abundant in GNP.

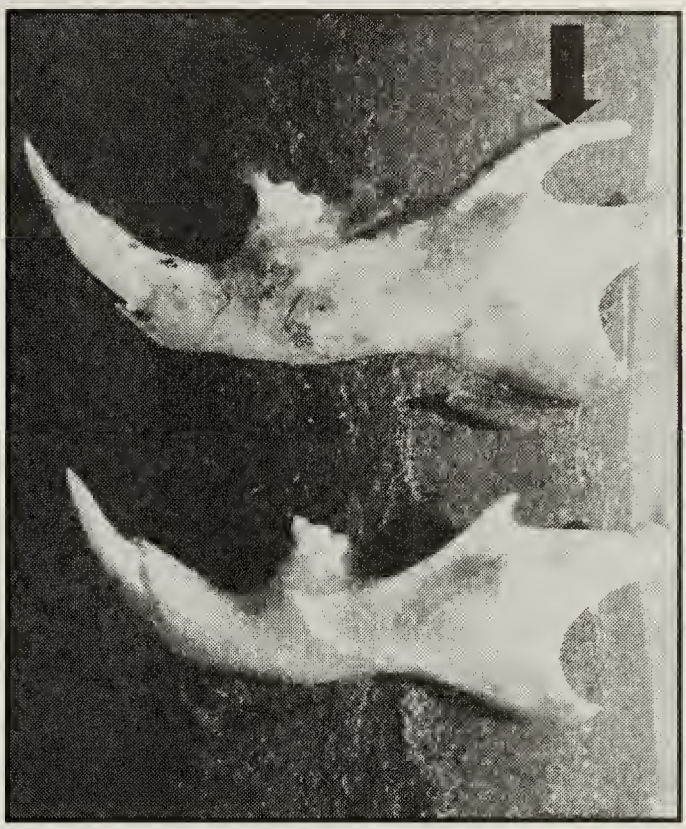

Figure 3. Lower jaws of Northern Grasshopper Mouse (top) and Deer Mouse (bottom) showing large curved coronoid process (at arrow) from the top right of the grasshopper mouse jaw that distinguishes it from the Deer Mouse jaw. / Tim Schowalter

Olive-backed Pocket Mouse

Olive-backed Pocket Mice have been trapped recently in various parts of GNP.[7] Those results and our owl pellet data suggest that the species is widespread and moderately abundant in GNP. The 33 Olive-backed Pocket Mice we found comprise 9% of the 351 mice and voles identified. As well, the species occurred in pellets at all five collection sites. Olive-backed Pocket Mice are listed as "S3" (Rare to Uncommon) in Saskatchewan.[9] This discovery of a good number of animals of a species identified as a potential conservation concern is encouraging.

Northern Grasshopper Mouse

In GNP, Northern Grasshopper Mice have been trapped in valleys and prairie dog colonies.[7] Only a single Northern Grasshopper Mouse was recovered in the pellets from the park (Fig. 3). The species is listed as "S3" (Rare to Uncommon) in

Saskatchewan.[9] Trapping and owl pellet results from GNP suggest that the animal is not common there.

Sagebrush Vole

Sagebrush Voles were found in all sites except the South Gillespie site. The species made up 13% of all the mice and voles identified. Sagebrush Voles have been trapped in GNP on eroded slopes, grassland slopes, and upland prairie.[6,7] Trap results and pellet analyses suggest that these voles are moderately common in the GNP area.

Western Jumping Mouse

While specimens have been taken in the region,[1,2] the two Western Jumping Mice from the Tantor Site represent the first record of the species for GNP.

Other Species

Remains of rabbits and hares were found in 35 pellets. Because of their large size, individual rabbits and hares are consumed as several meals by hawks and owls. It is rarely possible to be certain that remains in two different pellets are from the same animal. As a consequence, remains of individual rabbits or hares are likely to be in more than one pellet and be counted more than once. Counts of these larger animals can not be compared to those of the smaller mice and voles which are eaten whole. However, the number of pellets with rabbits and hares, and the animals' comparative large body size, show that they contribute greatly to the total mass of the diet of the birds.

A limitation of this study was that there are few old buildings available for use by owls in GNP. Consequently, collections were not made from large portions of the park. As well, all of the samples, including those under roosts outside of buildings, were from abandoned yards or, in the case of the Lochart Dam Site, an artificial reservoir. Such locations are considerably modified from the original native prairie. Our results, while contributing to the understanding of small mammals in GNP, may not be representative of large tracts of less modified habitat in the park. Collection and analyses of bird pellets at nest and natural roost sites in the park are likely to produce new information on the mammals there.

Acknowledgements

We thank local naturalists and landowners Thelma Poirier, Boyd Anderson, and Frank and Marjorie Linthicum for information and permission to enter their properties. Grasslands National Park Staff Leon Perrault, Dennis Madsen, Rob Watson, and the late Keith Foster relayed reports of observations of woodrats in the park. Earl Wiltse of Saskatchewan Environment and David Baron of the Royal Saskatchewan Museum encouraged this and related studies. David Baron and Keith Roney, Royal Saskatchewan Museum, accepted the specimens upon which this study was based.

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Hoary Bat **_Lorne Scott_**

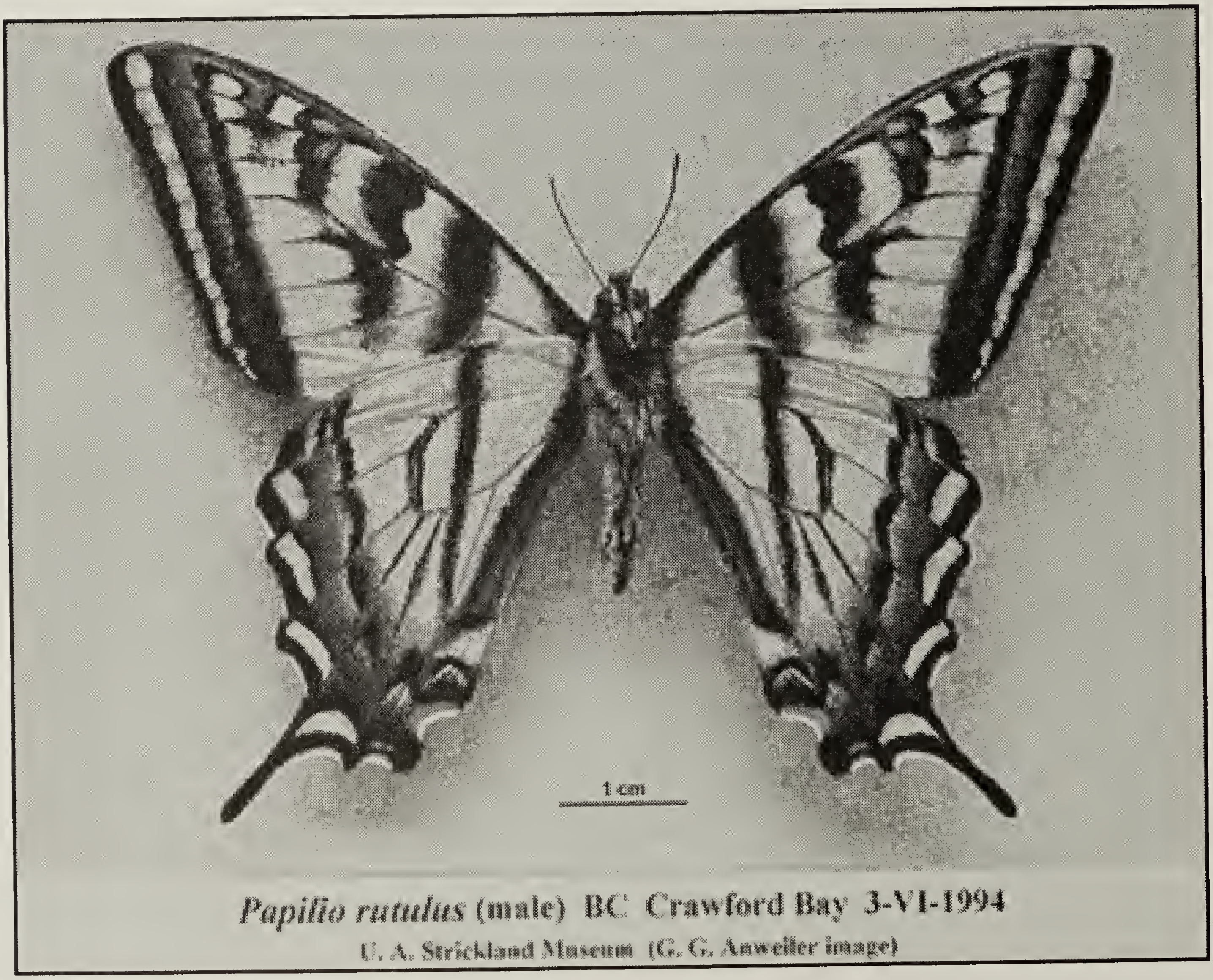
INSECTS

ADDITIONAL BUTTERFLY RECORDS FROM ALBERTA, 1999 - 2002

B. CHRIS SCHMIDT, 10941, 74 Ave. Edmonton, AB T6G 0E5
DOUG A. MACAULAY, 10015 - 80 Ave. Edmonton, AB T6E 1T4
NORBERT G. KONDLA, Box 244, Genelle, BC V0G 1G0
DAVID LAWRIE, 104 South Grove St., Apt. 1, Urbana, IL, USA 61801
GARY ANWEILER, 7212 - 103 Avenue, Edmonton, AB T6A 0V1.

Introduction

The following is a compilation of mainly recent butterfly records, which are noteworthy for extending the reported distribution or flight dates, or filling in distribution gaps as represented in recent works on the Alberta butterfly fauna.[9, 21] Bernadett's Checkerspot (*Euphydryas 'anicia' bernadetta*) and Egleis Fritillary (*Speyeria egleis*) are reported for the first time from Canada. Tremblay's Margined White (*Pieris marginalis tremblayi*) is reported from Alberta for the first time, and the presence of the Western Tiger Swallowtail (*Papilio rutulus*) in Alberta is confirmed.


1 cm
Papilio rutulus (male) BC Crawford Bay 3-VI-1994
U. A. Strickland Museum (G. G. Anweiler image)

Western Tiger Swallowtail, male, ventral ***G.G. Anweiler***

Most of the unusual flight date observations occurred in 1998 and 2002, which exhibited very early (1998) and delayed (2002) spring conditions. Much of east-central Alberta experienced severe drought conditions throughout the spring and summer of 2002, followed by a cool, wet period in late July. This resulted in unusual timing of flowering events, such as blooming violets and canola crops in mid-September near Wainwright. These conditions may also have triggered late butterfly emergences. Extreme southern Alberta experienced above average precipitation throughout the summer of 2002, and vegetation was exceptionally lush; large clusters of blooming Dotted Blazing Star (*Liatris punctata*) and knee-high needle-and-thread grass (*Stipa* spp.) gave Writing-on-Stone Provincial Park a spring-like appearance in early September!

All reported specimens were identified or had previous identifications verified by Chris Schmidt or Norbert Kondla. Voucher specimens for most records are placed in the University of Alberta Strickland Museum collection. Butterfly nomenclature primarily follows that of *The Butterflies of Canada*.[21]

Grizzled Skipper - *Pyrgus centaureae freija* (Warren)

Few populations of this skipper are known in Alberta. Several populations have recently been found in acidic bogs of the boreal region, at the town of Zama Lake (= Zama City, see Map1) on 2 June 1999 (DM); Highway 813, 55 km N of Calling Lake on 26 June 2001 (CS), and Dussault Lake Natural Area on 16 June 2001 (CS). Together with other reports of this species from Elk Island National Park and the Darwell area in 2000,[6] these records extend the known range southward and fill significant gaps in our knowledge of the distribution of this skipper.

In north-eastern Canada, between Labrador and Manitoba, the Grizzled Skipper has a two-year life cycle, being absent or rare in even-numbered years.[21] A thorough check of the Calling Lake locality in 2002 failed to turn up any skippers. Interestingly, no Grizzled Skippers were reported from the Elk Island and Darwell count in 2001.[7] This suggests that Alberta's boreal populations may also be biennial.

European Skipper - *Thymelicus lineola* (Ochsenheimer)

This introduced skipper has been expanding its range outward from the Edmonton area since the first specimens were discovered there in 1987.[8] This species was common in roadside ditches of the Hastings Lake area 35 km east of Edmonton in 1997, and is currently common to abundant in the greater Edmonton area.[10] A survey of the Highway 16 corridor between Edmonton and Wildwood in 1998 showed that it had spread to 10 km W of Evansburg, 130 km west of Edmonton (CS). On 27 July 2001 it was found south of Edmonton at the south end of Coal Lake, near Wetaskiwin (GA), and in 2001 for the first time at the north shore of Pigeon Lake (F. Sperling, pers. comm.). It has also expanded northward to at least the Redwater area within the last 10 years,[15] and occurs eastward to at least Kinsella.[6]

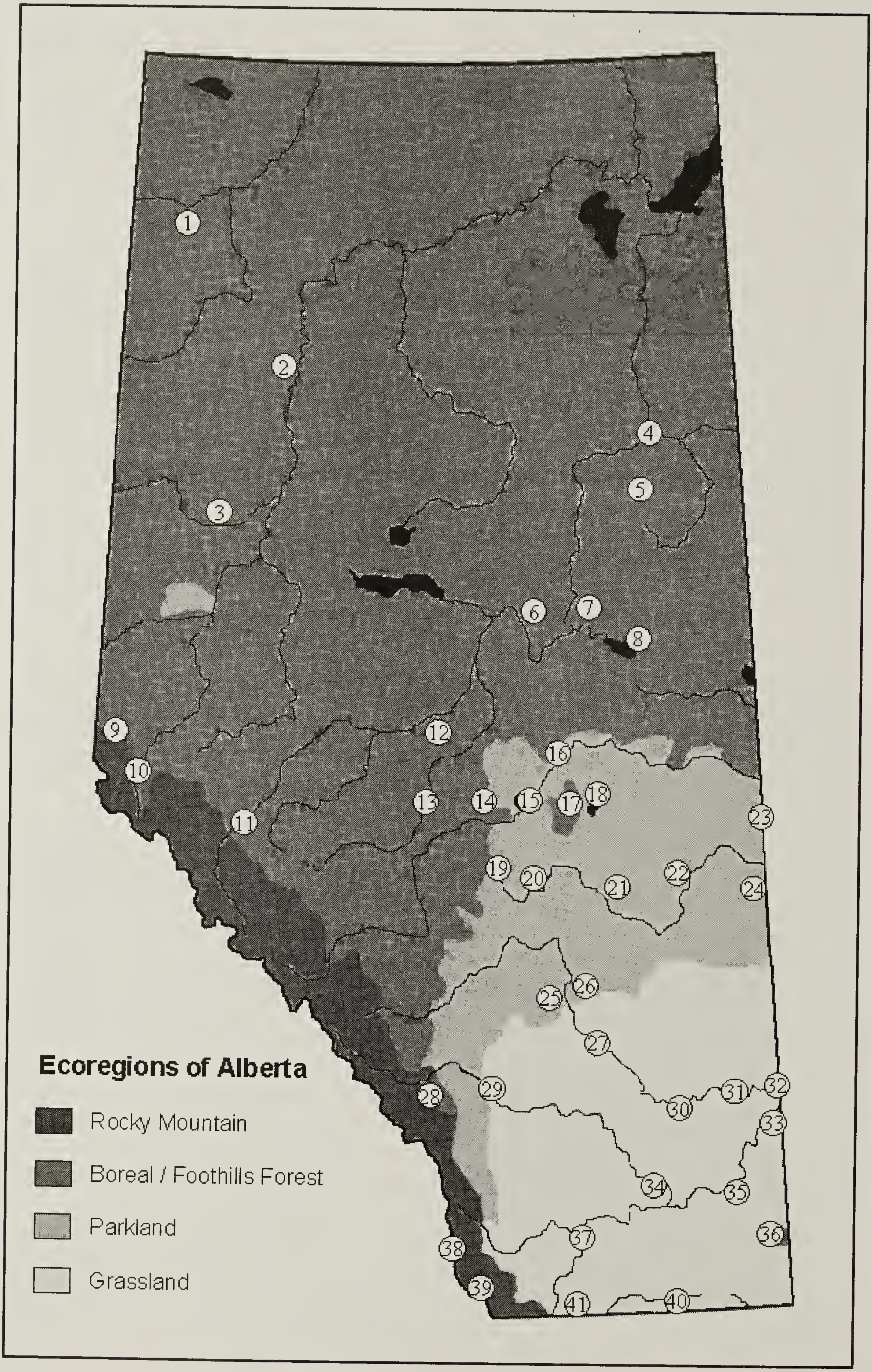
The European Skipper is currently also spreading eastward into the Crowsnest Pass region of Alberta, where it was found at the east end of Tent Mountain Pass by Ted Pike on 6 August 2001. This is not surprising, as it had been found in BC east as far as Sparwood (25 km northwest of Tent Mountain Pass) by 1999.[17]

Nevada Skipper - *Hesperia nevada* (Scudder)

Nevada Skippers were found along the Battle River west of Heisler on 21 June 2001 (CS). This expands the reported range north and west from the Rumsey and Lloydminster areas, respectively. This is the first report of this species from the Battle River valley.

Plains Skipper - *Hesperia assiniboia* (Lyman)

This species was found at the Rumsey



Map 1. Locations referred to in the text.

Ecological Reserve on the remarkably early date of 25 July 1998 (CS), likely a result of the early and unusually warm spring central Alberta experienced in 1998.

Rhesus Skipper - *Polites rhesus* (W.H. Edwards)

Prior to 2000, the only known Alberta record for this species was based on a specimen collected in the Milk River Valley during 1977.[29] John Acorn found and photographed this species along the rim of the South Saskatchewan River near Redcliff in May 2000 (pers. comm.). On May 19 and 20 that same year, we found Rhesus Skippers at several sites along the Red Deer and South Saskatchewan River valleys north of Redcliff: Jenner Bridge N of Jenner (GA), Highway 41 at South Saskatchewan River (GA, CS) and 6 km W of McNeill (CS). The first report of the Rhesus Skipper for Canada was a specimen collected by Ron Hooper at Fort Qu'Appelle, Saskatchewan in 1971.[13] While examining the skippers in the University of Alberta Strickland Museum recently, Chris Schmidt was surprised to discover a specimen of *P. rhesus* in a series of Uncas Skippers (*Hesperia uncas*). The specimen is a female with a Bowman label, collected at Medicine Hat on 21 June 1928. This specimen is significant in that it shows that this skipper is not a recent arrival to Alberta due to a population expansion. The paucity of records may be a result of annual fluctuations in numbers, as has been suggested for populations in North Dakota.[23]

Tawny-edged Skipper - *Polites themistocles* (Latreille)

Garita Skipperling - *Oarisma garita* (Reakirt)

Both species were found near Tiger Lily (17 km south of Ft. Assiniboine) on 7 July 2002, (GA, CS) extending the reported range to the northwest. Both skippers were common and nectaring on roadside alfalfa next to a semi-native pasture. Garita Skipperlings also occur in the Peace River grasslands to the northwest,[9] but these two populations appear to be disjunct.

Delaware Skipper - *Anatrytone logan* (W.H. Edwards)

This species was found at the Red Deer River crossing of Secondary Highway 876 on 12 July 2000 (DL). This occurrence fills a large distribution gap, with the nearest known occurrences over 100 km distant near Drumheller and Empress.[9] In 2002, it was

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Locations of place-names referred to in text:

Algar Lake - 5
Barrier Lake - 28
Beaverhill Lake - 18
Bluesky - 3
Buffalo - 31
Calgary - 29
Calling Lake – 6
Cooking Lake - 17
Crowsnest Pass – 38
Cypress Hills - 36
Darwell – 14
Dilberry Lake - 24
Drumheller - 27
Dussault Lake - 14
Edgerton - 24
Edmonton - 15
Elk Island Nat Park - 17
Empress - 32
Evansburg - 13
Fort McMurray - 4
Grande Cache - 10
Hawk Hills – 2
Hastings Lake - 17
Hays - 34
Heisler - 21
Hilda - 33
Hinton – 11
Jenner - 30
Jumpingpound Mtn. - 28
Kinsella - 22
Lethbridge - 37
Lloydminster - 23
McNeill - 33
Medicine Hat – 35
Ministik Lake - 17
Owl River – 8
Patricia - 30
Pigeon Lake - 19
Prairie Bluff Mtn. - 39
Red Deer R. @ Hwy. 876 - 30
Redcliff - 35
Redwater - 16
Rumsey - 26
S. Saskatchewan River - 33
Tiger Lily - 12
Torrens River - 9
Trochu - 25
Wandering R. – 7
West Castle R. – 39
Wetaskiwin - 20
Whiskey Gap - 41
Windsor Mtn. - 39
Whistler Mtn. - 39
Writing-on-Stone Prov. Park - 40
Zama Lake town (=Zama City) - 1

also found near Patricia on 10 July by Jim Beck and Jeff Manchak (NK). These records are the result of recent surveys of grassland habitats. Although most recently treated as subspecies *lagus*,[21] it has long been pointed out that Alberta populations are not typical *lagus* and should not be assigned to subspecies until further study.[29]

Woodland Skipper - *Ochlodes sylvanoides* (Boisduval)

This species was found to be common at Writing-on-Stone Provincial Park 1 - 4 September 2002 (GA, CS). A specimen was also caught there in an ultraviolet light trap on 13 August 1996 (GA). This is a new locality for this species. The Woodland Skipper may have expanded its range northward to the Wintering Hills southeast of Drumheller within the last 20 years,[15] and it has apparently also established itself in Drumheller, where Ted Pike found it in August of both 2001 and 2002.

Hobomok Skipper - *Poanes hobomok* (*Harris*)

The Hobomok Skipper is encountered regularly in the North Saskatchewan River valley in Edmonton, a significant westward expansion of the range depicted in recent books.[9,21] This species also occurs locally 25 km and 40 km east of Edmonton, at the North Cooking Lake Natural Area (north shore of Cooking Lake) and the Ministik Game Bird Sanctuary (CS). It was also found on 3 July 2000 at Pigeon Lake Provincial Park (F. Sperling). The female Hobomok Skipper figured in *Alberta Butterflies* [9] is a misidentified female Peck's Skipper *Polites peckius* (Kirby).

Oslar's Roadside Skipper - *Amblyscirtes oslari (*Skinner)

One individual of this rare and local skipper was found in sparsely vegetated grassland among the eroding hoodoos of Writing-on-Stone Provincial Park on 29 May 2000 (CS). There are fewer than ten known localities for this species in Canada, four of which are in Alberta.[20,21]

Common Roadside Skipper - *Amblyscirtes vialis* (W.H. Edwards)

Although this species is widely distributed across the province, there are no previous occurrences in a band from Calgary east to the Saskatchewan border.[9] The following new records fill in this gap: Calgary (Sandy Beach Park), 27 June 1997; Highway 41 at South Saskatchewan River, 20 May 2000; and Lethbridge, 24 May 1999 (all DL).

Old World Swallowtail - *Papilio machaon* L.

The prairie subspecies (*dodi* McDunnough) was found in the Battle River valley west of Heisler on June 13 and 21, 2001 (CS). There are no previous records of the Old World Swallowtail from the Battle River valley, and this locality is a slight northern range extension.

A female of the Peace River grassland subspecies (*pikei* Sperling) was collected nectaring on alfalfa on the north bank of the Peace River south of Bluesky on 7 August 2002 (CS and W. Nordstrom). This is over three weeks later than previous records.[18] The cold and delayed spring in the Peace River district in 2002 may account for this unusually late emergence.

The boreal subspecies (*hudsonianus*) has also been collected recently at several new locations: northwest of Hinton (near Highway 40 at Big Berland River), 22 July 2000; Clear Hills lookout tower near Worsley, 4 July 2000; and Gator Ridge 27 km northeast of Zama Lake town on 27 May 1998, 5 June 1999 and 21 - 23 June 1999 (all DM). Kris Sabourin also found this species at the Algar Lake airstrip along Hwy. 63 southwest of Fort McMurray on 30 May 1998, filling in a large distribution gap between the Pelican Hills (north of Calling Lake) and Lake Athabasca.[9]

Western Tiger Swallowtail- *Papilio rutulus* Lucas

Ted Pike collected this species in early July of 2002 along the South Castle River and northwest of the Castle River campground at Ghost Creek (West Castle River area). This is the first confirmed report of the Western Tiger Swallowtail for Alberta. Apparent hybrids between this species and the Canadian Tiger Swallowtail (*P. canadensis* Roth. & Jordan) are found occasionally, and have been reported from Alberta.[21]

Margined White - *Pieris marginalis* Scudder

The Margined White has been reported as far north as the Bow River valley in Alberta.[9] Previously unreported specimens from the Torrens River area, 70 km NW of Grande Cache, collected by G. Hilchie between 1981 and 1985, are also attributable to this species. Additional records for this region are for Highway 666 at Lick Creek, 16 July 1996 (DL). Although at first glance this appears to be a northward range extension, British Columbia records indicate this species is present to the west in the McBride area.[12] Guppy and Shepard treat these BC populations, which are indistinguishable from the Torrens River specimens, as subspecies *tremblayi* Eitschberger (described from Pink Mountain, BC)[12]. This is the first report of *P. marginalis tremblayi* from Alberta.

Large Marble - *Euchloe ausonides mayi* Chermock & Chermock

This typically boreal butterfly was found in a parkland - sand dune complex in east-central Alberta at Dilberry Lake Provincial Park on 26 May 2001 (CS & GA) and near Edgerton on 1 June 2002 (GA). Previous records for eastern Alberta are all from the boreal forest zone, or from further south along the badlands of the Red Deer River and southward.[9] Several specimens were also collected at the Redwater Natural Area on 2 May 1998 (DL, GA & CS), slightly earlier than the previously reported earliest flight date.[9]

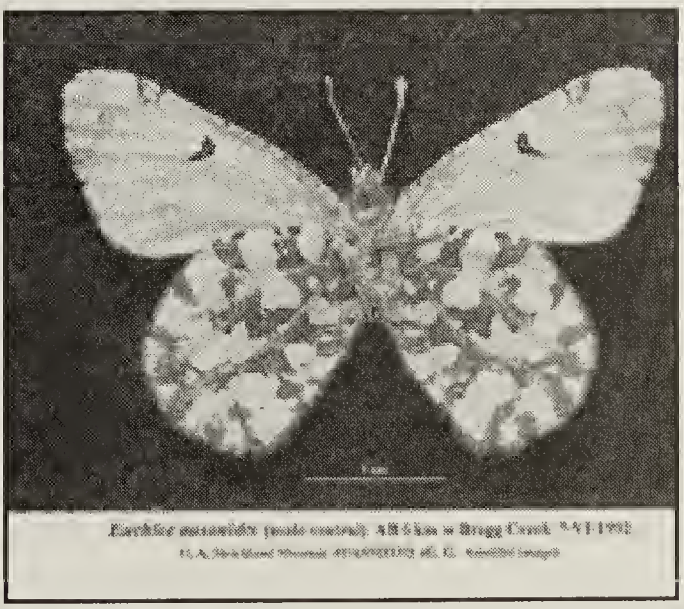
Most Canadian populations have recently been assigned to subspecies *ausonides*,[21] but descriptions of typical *ausonides* from California[2] do not match Alberta specimens. Based on our present knowledge, the best subspecies assignment for Alberta populations appears to be *mayi*.[9]

Canada Sulphur - *Colias canadensis* Ferris

Canada Sulphurs were found in old growth White Spruce forest 29 km NE of the town of Zama Lake on 19 and 30 June 1997, 3 July 1997, 26 May 1998, and 21 June 1999 (DM). Individuals were observed drinking at puddles or flying down cutlines and along roadsides. Of the 11 specimens collected, only two were males.

Chippewa Sulphur - *Colias chippewa* W.H. Edwards

This typically subarctic species was discovered at three new locations in Alberta during the summers of 1998 – 1999, doubling the number of reported localities for Alberta.[21] Specimens were collected 29 km NE of the town of Zama Lake on 10 June 1998 and 12 and 22 July 1999; along the Adair Fire Tower access road E of Zama Lake town on 8 July 1999, and along the Chinchaga Fire Tower access road west of Hawk Hills in July 1999 (all DM). Two of the specimens collected near the town of Zama Lake were found resting in a wet area of a black spruce bog but all others were caught flying along roadsides.



Large Marble, male, ventral

G.G. Anweiler

This sulphur has usually been treated as a subspecies of the European *C. palaeno*,[9,21] but these two butterflies have different habitat preferences where they co-occur in Siberia, consistent with differences in wing markings and size,[30] and are therefore best treated as separate species.[12]

Bronze Copper - *Lycaena hyllus* (Cramer)

There are few reported localities for this species in the boreal forest of Alberta, likely a result of its fondness for willow-sedge fens and marshes, which are not investigated by butterfly enthusiasts as often as drier habitats. A colony was found about 20 km north of Wandering River on 23 July 1997 (CS), which fills a large distribution gap between Edmonton and Fort McMurray. Another colony was discovered in an alkaline fen east of the town of Zama Lake on 16 August 1997 (DM & G. Pohl). The Bronze Copper was also found at the Forestry Trunk Road / Oldman River junction (40 km north of the Crowsnest Pass) on 1 August 2001 (NK), one of the few records for the mountain region.[9]

Ruddy Copper - *Lycaena rubida sirius* (W.H. Edwards)

Most reports are from the southeast corner of the province.[9] New reports, over 70 km NW of previous records, are near the Highway 876 crossing of the Red Deer River on 12 July 2000, and north of Buffalo on 26 June 2000 (DL).

Blue Copper - *Lycaena heteronea* Boisduval

This species is generally restricted to low elevations in Alberta,[9] but it was found above tree line in 2001 at Hailstone Pass and Sugarloaf Mountain near patches of umbrella-plant (*Eriogonum* sp.), its larval host plant (NK).

Dorcas Copper - *Lycaena dorcas* W. Kirby

A single freshly emerged male was collected on 24 August 2002 in the sandhills just east of Edgerton (GA). This extends the range in eastern Alberta some 100 km southward into the aspen parklands. The Dorcas Copper is a species of boreal fens and bogs, and the Edgerton population is unusual and may be quite isolated. The male specimen illustrated as *dorcas* in *Alberta Butterflies* [9] is actually a male Purplish Copper (*L. helloides*).

Mariposa Copper - *Lycaena mariposa penroseae* Field

A colony of Mariposa Coppers was found on an overgrown trail located along the Chinchaga Fire Tower Road, west of Hawk Hills on 26 July 1999 (DM). The butterflies were sunning themselves on alder leaves.

Grey Hairstreak - *Strymon melinus* Hübner

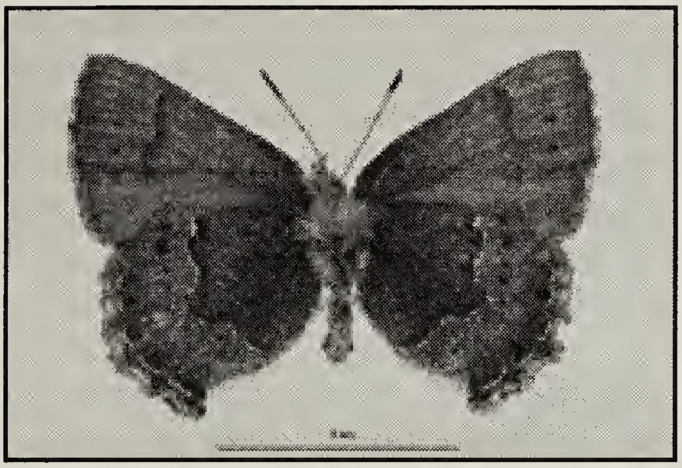
In Alberta, the Grey Hairstreak is uncommon and local and there are few records from north of the South Saskatchewan River. This species was found at the Red Deer River crossing north of Jenner on 19 May in 2000 (DL, CS & GA) and at the South Saskatchewan River bridge near Hilda on 20 May and 26 June (DL). Grey Hairstreaks were also found near the Highway 876 crossing of the Red Deer River on 30 April (an early flight date record) and 12 July 2000 (DL).

Although Alberta populations have been referred to subspecies *franki* Field [12,21] (originally described from Kansas), our Gray Hairstreaks do not look like typical *franki* [29] and should not be assigned to subspecies until further study has been done.

Moss's Elfin - *Callophrys (Deciduphagus) mossii* (H. Edwards)

Until recently, the only known Alberta population of this species was found at Windsor Mountain in the West Castle River valley.[9] On 24 May 1999, it was also found at Whistler Mountain, not far from the location of the Windsor Mountain colony (CS, DL, GA). Jim Beck also collected a flight-worn female at Prairie Bluff Mountain on 12 July 2002, a very late flight date and a new locality.

Johnson[14] segregated the North American



Moss's Elfin, male, ventral
G.G. Anweiler

non-conifer-feeding elfins into the newly described genus *Deciduphagus*. Usage of this new name has not been addressed by North American workers, possibly as a result of where this work was published (see discussion under Greenish Blue, below). Here, we consider this genus to be a valid natural grouping of species, but prefer a broader definition of the genus *Callophrys*, and retain *Deciduphagus* and *Incisalia* as subgenera.

Hoary Elfin - *Callophrys (Deciduphagus) polia obscura* (Ferris & Fisher)
Brown Elfin - *C. (D.) augustinus augustinus* (Westwood)

These two elfins are typical of boreal and montane habitats, so we were surprised to find colonies of both species in the sandhills at Dilberry Lake Provincial Park on 26 May 2001 (GA & CS). Hoary Elfins were also found in the sandhills southwest of Edgerton on 1 June 2002 (GA). Colonies were associated with patches of the presumed larval hostplant, Bearberry (*Arctostaphylos uva-ursi*). These elfin populations are quite isolated, with the nearest suitable boreal habitat over 100 km to the north. Isolated prairie populations of the Brown Elfin also occur in the Wintering Hills southeast of Drumheller and the lower Milk River valley.[9] Jeanette Pepper also found a specimen associated with bearberry in Grasslands National Park, southern Saskatchewan in 2002 (Ron Hooper, pers. comm.).

Eastern Pine Elfin - *Callophrys (Incisalia) niphon clarki* (T.N. Freeman)
Western Pine Elfin - *C. (I.) eryphon* (Boisduval)

Both pine elfin species were found near the town of Zama Lake in a small lodgepole pine stand, on 26 May 1998 (*C. niphon*) and 24 May & 4 June 1999 (*C. eryphon*) (DM). These records fill in large gaps in the known distribution of these species, with the nearest records of *eryphon* about 200 km to the south and *niphon* 150 km to the east.[9,21]

Alberta specimens of Western Pine Elfins often have a pinkish or purplish cast to the underside, a character that is not consistent with the original description of this species, and therefore should not be assigned to the nominate subspecies, as has been done in recent books.[9,12,21] The ventral forewing cell bar character purported to be an identification character to separate *C. niphon* from *C. eryphon* [12,21] is not reliable. The Eastern has a more irregular, white-edged median band on the hindwing underside, and the outer edges of the submarginal arrow-shaped marks do not reach the wing edge as they do in *eryphon*. The male specimen of the Eastern Pine Elfin figured in *Alberta Butterflies* [9] is actually a female Western Pine Elfin.

Coral Hairstreak - *Satyrium titus immaculosus* (W.P. Comstock)

A female, found nectaring on goldenrod on 18 September 2002 about 8 km southeast of Edgerton, extends the reported flight date range by two weeks (GA & CS).[9]

Rocky Mountain Dotted Blue – *Euphilotes ancilla* (Barnes & McDunnough)

A male was found on the south slopes of the Bow River near Hays on 5 June 1998 (DM). This represents a slight northern range extension for this species, which is known from relatively few localities in Alberta, with the northernmost occurrence near Lethbridge.[9]

Western Tailed Blue - *Cupido amyntula* (Boisduval)

The Western Tailed Blue was another species that occurred unusually late in 2002, recorded from Barrier Lake in Kananaskis Country on August 17 (CS). The previous late record was August 9.[9] Interestingly, this typically low-elevation species was found in 2001 inhabiting the steep, herbaceous alpine meadows above Window Mountain Lake in the Crowsnest Pass region (NK & T. Pike).

Several recent publications properly place our tailed blues, previously assigned to *Everes*, in the genus *Cupido*.[25,11]

Arrowhead Blue (*Glaucopsyche piasus daunia*)

The Arrowhead Blue is an uncommon and local species in Alberta. Previous, unreported records include a female at the Milk River north of Del Bonita (a new locality but within the known distribution) on 2 July 1997 (DL), and a female collected at Bellevue on 15 June 1996 (DM). This latter record extends the Arrowhead Blue's reported range west into the Crowsnest Pass.

Silvery Blue - *Glaucopsyche lygdamus couperi* Grote
Greenish Blue - *Aricia saepiolus amica* (W.H. Edwards)

These two species of blues were found on Jumpingpound Mountain near Bragg Creek on 20 August 2002 (CS), extending the reported flight range by several days.[9] Silvery Blues were also observed in Fort McMurray along the west-facing slope of the Hangingstone River on 2 September 2002 (DM), later than any previous records for this species.[9]

The Greenish Blue has been placed in the genus *Plebejus* (= *Plebeius*) in recent books.[9,12,21] Readers interested in the appropriate usage of *Plebejus* vs. *Plebeius* can refer to Balint *et al.*[3] Balint and Johnson reviewed a large section of the world's blue fauna (the Polyomatini), and provide sound reasons for transferring *saepiolus* to the genus *Aricia*.[4] This work has apparently been overlooked or ignored by North American workers; Shepard[28] presents possible reasons why this arrangement has not been accepted on our continent, and Kondla[16] points out that the reasons laid out by Shepard are unwarranted.

Shasta Blue - *Aricia shasta minnehaha* (Scudder)

Shasta Blues were found in eroding hillside habitat on the west-facing slopes of the Red Deer River east of Trochu on 1 July 2001 (GA & CS). This locality slightly extends the range of this species to the north of distributions depicted in recent books.[9,21] Uncommon at this location, the butterflies were observed nectaring on a species of yellow aster and on umbrella-plant (*Eriogonum* sp.).

This species has previously been placed in the genus *Icaricia*[12,21] or *Plebejus*.[9] We follow the generic assignment proposed by Balint and Johnson.[4]

Melissa Blue - *Plebejus melissa* (W.H. Edwards)

This species was found at the south end of Coal Lake near Wetaskiwin on 9 June 2001 (GA & CS). One worn female was also found in a meadow on the north shore of Ministik Lake on 29 August 2001 (CS). There are few records of the Melissa Blue in this region, near the northwestern limit of its North American range. These are apparently the first records for the Edmonton region since 1915, when the last known specimens were collected by Kenneth Bowman (Strickland Museum, University of Alberta). Genitalic examination of specimens from the Peace River grasslands [9] previously thought to be *melissa* show that they are in fact allied to the Northern Blue, *P. idas* (CS). Further work is necessary to clarify the status of the Peace River *idas / melissa* population. Despite claims that the Melissa Blue thrives in agricultural alfalfa fields throughout its western range, and is double-brooded only when associated with alfalfa,[24] we have found it only in native grasslands.

We place *melissa* in the genus *Plebejus*, following the work of Balint and Johnson [4] rather than *Lycaeides* of most recent works. [9,12,21] It should also be noted that both individuals of Melissa Blue depicted in *Alberta Butterflies* [9] are actually misidentified specimens of Northern Blues. Due to the obvious difficulty in separating these two species, the published occurrences and distribution of the Melissa Blue in the southern foothills and mountains of Alberta, where both species may occur, [9,21] needs re-evaluating.

Cranberry Blue - *Albulina optilete yukona* (Holland)

Two Cranberry Blue specimens were collected by Felix Sperling in a small bog at the north end of Pigeon Lake on 12 July 2002. This extends the range of this boreal species 50 km southward from the Edmonton area. This species was also found in black spruce bogs near the town of Zama Lake on 28 July 1997 and 21 July 1998 (DM) and along Highway 813 9 km S of Calling Lake on 7 July 1999 (DL).

The Cranberry Blue was previously placed in the genus *Vacciniina*; Balint and Johnson[4] revised the generic placement.

Rustic Blue - *Agriades rusticus* W.H. Edwards

In favourable years, prairie populations of the Rustic Blue have at least a partial second brood. The unusually warm and early spring of 1998 apparently facilitated a very early second brood at the Rumsey Ecological Reserve, where freshly emerged individuals were found on May 13 and again on 26 July (CS). This is much earlier than previous September records for the second brood.[19]

This blue is known under a variety of both English and Latin names,[19] including Arctic Blue, Rustic Blue, *Plebejus aquilo, Agriades glandon* and *Agriades rusticus*. [9,12,13,21] We treat *rusticus* as a species separate from the arctic/alpine entities (*aquilo, glandon, megalo*) due to the different appearance, ecology, and broodedness of prairie populations, and the lack of intergradation between prairie and mountain populations where these occur in close proximity in southwestern Alberta.

Aphrodite Fritillary - *Speyeria aphrodite* (F.)

One flight-worn individual found at Dilberry Lake Provincial Park on 18 September 2002 (GA & CS) extends the flight period by over three weeks.[9]

Egleis Fritillary - *Speyeria egleis* (Behr)

A fritillary collected at Whiskey Gap on 26 June 1983 (NK) has recently been identified as *Speyeria egleis* with the help of Paul Hammond. This record is mapped in *Butterflies of British Columbia* (p. 360), [12] where it is incorrectly attributed to subspecies *albrighti*. Gerald Hilchie also collected this species in the Cypress Hills in 1999 and Ted Pike found it there in 2000. Another specimen was collected near Pincher Creek southwest of Lethbridge in 2002 by Dean Nicholson. These are the first records of this species for Canada.

Rockslide Checkerspot - *Chlosyne damoetas altalus* Scott

This species was found on a scree slope on Mount Hammell, near Grande Cache on 19 July 1998 (DL). This is the first reported occurrence north of the Athabasca River, and extends the North American range over 170 km northwest of the Cadomin area (southwest of Hinton), the previous northern range limit.[21]

Examination of Alberta specimens reveals that Alberta populations are best assigned to subspecies *altalus,*[27] not *damoetas*.[12,21]

Gorgone Checkerspot - *Chlosyne gorgone carlota* (Reakirt)

This species has a local and sporadic distribution in Alberta, with adults on the wing from May into July.[9] It was therefore unexpected when John Acorn found this species locally common at Medicine Hat in early September of 2002, nearly two months later than the previous late date of July 15.[9] This is the first report of a probable second brood for Alberta; Layberry *et al.* state that only one brood occurs in western Canada,[21] but a second brood occurs, at least on occasion, in Saskatchewan.[13] Local colonies flying late in the season may have been overlooked previously in southern Alberta, or this species may be responding to warming climate trends by producing a second brood some years.

Bernadett's Checkerspot - *Euphydryas 'anicia' bernadetta* Leussler

On 26 June 1984 Kondla collected a series of 45 *Euphydryas* at two locations in the Cypress Hills. A few specimens were examined for the presence of Edith's Checkerspot, *E. editha hutchinsi* McDunnough, but close examination of all specimens was not carried out until 2001. Examination then revealed that the individuals from one location were all 'typical' reddish Anicia Checkerspots, *E. anicia* subspecies, but that the second locality supported two distinct phenotypes flying together. Here the freshly-emerged, reddish *E. anicia* were accompanied by mostly flight-worn, whitish Bernadett's Checkerspot (*E. 'anicia' bernadetta*) phenotypes. These were compared to specimens of *bernadetta* from the type locality (Monroe Canyon, Sioux Co.,Nebraska) provided by S. Spomer, and found to be indistinguishable. Additional specimens of Cypress Hills *bernadetta* exist in the Canadian National Collection and have also been collected there by Ted Pike. Consequently we report a new butterfly taxon from Alberta and from Canada – *Euphydryas 'anicia' bernadetta.*

Gorgone Checkerspot, male,ventral
G.G. Anweiler

Sympatric occurrence of two distinct-looking butterflies, coupled with a difference in flight period, is normally cited as convincing evidence of distinct species, rather than subspecies, status for such phenotypes. Steve Kohler (pers. comm.) has found that *bernadetta* is also sympatric with *anicia* in Montana, again with a difference in flight period. This strongly supports the observation made by Bauer (p. 652)[5] that "there is a fairly good possibility that this group is a separate, but closely related, species instead of a subspecies of *anicia.*" The group that Bauer referred to is a suite of named populations that share phenotypic and ecological similarities over a substantial area in the interior of North America. Available information certainly supports recognition of *Euphydryas bernadetta* as a species distinct from *anicia.*

Hoary Comma - *Polygonia gracilis* (Grote & Robinson)

Two specimens were collected nectaring at clover near the town of Zama Lake (29 km NE) on 12 August 1997 (DM). This is a regional record for the northwest boreal part of the province.

Hybrid White x Lorquin's Admiral - *Limenitis arthemis* (Drury) x *lorquini* Boisduval

Both the White and Lorquin's Admiral occur together in the Waterton – Crowsnest Pass region of Alberta, and hybrids have been found there on occassion.[9] A hybrid female was collected on 24 July 1999 in the West Castle River valley (DL), and another hybrid individual was collected at the base of Sugarloaf Mountain (north of the Crowsnest Pass) on 2 August 2001 (NK). This is a

Lorquin's Admiral, male, ventral
G.G. Anweiler

substantial northward extension for a hybrid admiral in Alberta.

Viceroy - *Limenitis archippus* (Cramer)
A single very worn individual was collected at Writing-on-Stone Provincial Park on 3 September 2002 (GA). This is almost three weeks later than the latest known flight date (August 12).[9] A single individual was also seen in Edmonton in early September 2001 (GA), unusually late for this species. This species was also collected in the Swan Hills (90 km NW of Tiger Lily) on 1 July 1988 (DM). This record fills a large gap in the known distribution of the east-central boreal region of Alberta.[21]

West Coast Lady - *Vanessa annabella* (Field)
A large spring migration of the Painted Lady (*Vanessa cardui* [L.]) occurred in Alberta during 2001. Rather surprisingly, a specimen of the West Coast Lady was captured among individuals of the Painted Lady on 8 June 2001, near the west shore of Beaverhill Lake (CS). This species was previously recorded from as far north as Calgary.[21] It should be watched for among migrating Painted Ladies.

Ochreous Ringlet - *Coenonympha ochracea mackenziei* Davenport
Ochreous Ringlets were found in an alkaline fen east of the town of Zama Lake on 16 August 1997 (DM). This extends their range south into the northwestern part of the province.

Although recent books treat some or most of the North American populations as part of the European species *tullia*, [10,19] no compelling evidence has been published to follow this interpretation. We follow the nomenclature presented by Bird *et al.* [9]

Chryxus Arctic - *Oeneis chryxus caryi* Dyar
A single specimen of this species was found in open, sandy jack pine woods near the locality of Owl River north of Lac La Biche on 20 May 2000 (DM). This is a new locality for the province, and extends the known range southward by about 200 km from Fort McMurray.[9]

Uhler's Arctic - *Oeneis uhleri varuna* (W.H. Edwards)
The northernmost breeding populations occur locally in the parkland region on grassy, south-facing slopes of the North Saskatchewan River valley. Two additional populations were found on 16 May 2001 on the banks of the North Saskatchewan River where Highway 855 and 831 cross the river, east of Redwater (CS).

Alberta Arctic - *Oeneis alberta alberta* Elwes
Several individuals were found in a sandy pasture at the north end of Beaverhill Lake on 16 May 2001 (CS), extending the range about 90 km to the north.[9]

Northern Pearly Eye - *Enodia anthedon borealis* A.H. Clark
The Northern Pearly Eye was not known to occur in Alberta until 1990.[26] New Alberta localities for this species include the Cooking Lake area east of Edmonton in the Blackfoot – Cooking Lake Grazing Reserve in 1999 and 2002; Ministik Game Bird Sanctuary in 2001; and 35 km north of Boyle (SW of Wandering River) in 2002 (all CS). Also recently recorded from the Beaverhill Lake Natural Area and Elk Island National Park.[6,10] These records extend the known

range of this uncommon and local species by about 200 km to the southwest.[9]

Layberry et al.[21] do not recognize any subspecies for Canadian populations of *anthedon*. The subspecies *borealis* was described from Hymers in western Ontario, and Masters[22] pointed out that differences in adult behaviour observed between nominate *anthedon* and adjacent *borealis* populations might indicate species-level differences. A careful comparison of ecological, morphological and genetic characters is needed to shed light on the relationships among populations of this interesting species-group.

Common Wood-nymph - *Cercyonis pegala ino* Hall

Several individuals were found near Edgerton on 15 September 2002 (GA & CS), an unusually late flight date for this species. The previous late record is September 7.[9]

Dark Wood-nymph - *Cercyonis oetus* (Boisduval)

This species was found to be quite common at lower elevations in the Grande Cache area in July of 1997,1998 and 2000 (DL). This is the northernmost known occurrence of this species in the province[9] and the presence of this butterfly in this area fills in a gap in the distribution with more northern populations in the Peace River district of BC.[21]

Monarch - *Danaus plexippus* (L.)

A single Monarch was collected at Writing-on-Stone Provincial Park on 3 September 2002 (GA), over a week later than previous records show (August 25).[9] A specimen was also found on 16 June 2002 near Standard (NK). The Monarch is very rare or absent in Alberta during most years, and numbers appear to have been higher than usual in 2002.

Although similar in colouration and pattern to the Viceroy, Monarchs are easy to recognize on the wing by their very distinctive flight. Monarchs have a leisurely, floating flight and hold their wings at an angle above the body when gliding, whereas Viceroys hold their wings in a flat plane when gliding, a behaviour characteristic of the genus *Limenitis*.

Acknowledgements

John Acorn, Gerald Hilchie, Ron Hooper, Dean Nicholson, Ted Pike, Kris Sabourin and Felix Sperling kindly provided additional information and specimen data. Felix Sperling reviewed an earlier draft of this article.

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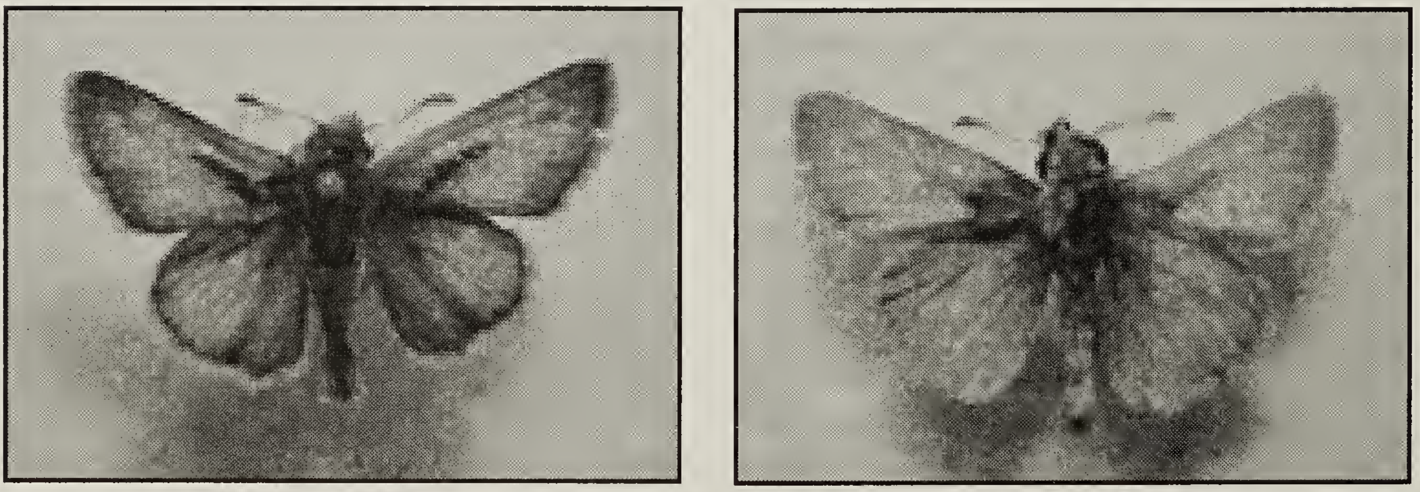
DAKOTA SKIPPER (*Hesperia dacotae*) IN SASKATCHEWAN

RONALD R. HOOPER, Box 757, Fort Qu'Appelle, SK S0G 1S0

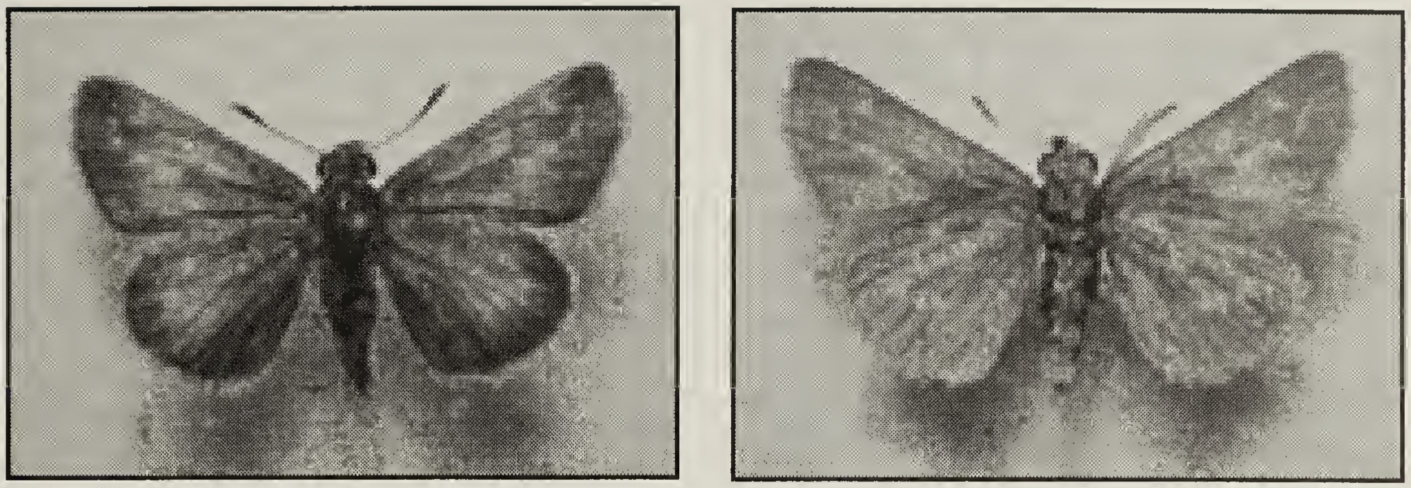
On July 19, 2001, I collected three male Dakota Skippers (*Hesperia dacotae*) on a prairie hilltop near Oxbow, Saskatchewan. These were the first known records of this species of butterfly for the province. These males had established territory which they guarded from high perches on top of purple coneflowers (*Echinacea angustifolia*). When disturbed they would dash off, but later return to the same perches. The Dakota Skipper has previously been taken as far west as Brandon, Manitoba and McKenzie County in western North Dakota.[1]

In July 2002, Reginald Webster did a Canadian survey in Manitoba and southeastern Saskatchewan of the Dakota Skipper for COSEWIC.[2] On July 11, he observed about 22 individuals in the Oxbow area. Three other Dakota Skipper records from Saskatchewan in 2002 were a female collected near Roche Percee on July 1 by Daniel Glaeske; a female collected south of Glen Ewen along the east slope of the Souris River Valley on July 28 by John Kozial; and a worn female collected 5 km east of Roche Percee on 29 July also by John Kozial.

The identity of our Saskatchewan specimens was confirmed by Ronald Royer of Minot State University who viewed high resolution jpg files of one of the 2001 males



Male Dakota Skipper collected by Ron Hooper at Oxbow, SK on 19 July 2001 (left - dorsal surface, right- ventral surface) / Jeanette Pepper



Female Dakota Skipper collected by John Kozial at Glen Ewen on 28 July 2002 (left - dorsal surface, right - ventral surface) / Jeanette Pepper

and the female collected by Daniel Glaeske. He was amazed that they have such a long flight period in Saskatchewan. Perhaps our cold spring had set some of them back for a later emergence in 2002.

The United States population of the Dakota Skipper has been declining, partly because of loss of habitat. Although the species is not immediately threatened or endangered in North Dakota, there are long term threats related to land management practices. Grazing is hard on the species in the drier western parts of its range, probably because of soil compaction and consequent changes in the microhabitat moisture regime. Habitat that is on land that is hayed (which often occurs late in the season) does not degrade as quickly as that on grazed land. (Ron Royer, pers. comm. 22 April 2003). The survey by Reginald Webster in Manitoba shows that it is not in immediate danger in that part of its range, but due to habitat loss it is no longer found in a number of areas where it occurred previously.

Skippers of the genus *Hesperia* are, on the upper surface, predominantly tawny orange and edged with dark brown in males, and dark brown with tawny orange bands in females. They are from 24 to 32 mm in wing expanse. On Dakota Skipper males, the dark borders on the upper wing surface are narrower than in most of the other species of the genus. The Nevada Skipper is very narrowly edged with dark on the hind wing but the narrow edging is more even than in the Dakota Skipper, which has edging that is jagged with dark points extending between the veins. Leonard's Skipper (*Hesperius leonardus*) also has this feature, but is larger and flies later. (Leonard's Skipper was rediscovered near St. Victor by Daniel Glaeske in August 2001.)

On the underside, male and female Dakota Skippers have a tawny brown to light brown ground colour with greatly reduced markings. The lower edge of the forewing is darker than in the other species of *Hesperia* and the light band of the forewing is more continuous.

Our Saskatchewan butterfly list is now at 158 species.

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NOTES AND LETTERS

BUR OAKS, LARGE AND SMALL

In the June 2002 *Blue Jay*, there was an article on oak trees. An elderly couple who are friends of mine have a Bur Oak tree in their back yard in the city of Estevan. It is mature and for at least 12 to 15 years has been producing acorns. My friend says that it is hard to get the acorns before the squirrel comes for them.

Over the years my husband and I have transplanted small oak seedlings from her yard. They are growing well out on our farm, but the deer keep eating at them which makes it hard for them to grow taller.

You may find interesting some information that appeared in the Williston ND paper, ("Mayville farm has champion oak tree," *Plains Reporter*, October 30, 2002). Based on State Forest Service measurements, the largest Bur Oak in North Dakota is 83 feet tall, with a circumference of more than 12 feet and an average crown spread of 63 feet. Mayville is in the eastern part of the state.

Cheryl Andrist, Box 89, Estevan, SK S4A 2A2

OSPREY ATTACK ON A HARLEQUIN DUCK BROOD

At 5:00 PM on 27 August 1998, Mark Bugera, Rainer Ebel, Barry Godsalve and myself were setting up a mist net to capture a Harlequin Duck brood at the lower end of a pool in the McLeod River located in west-central Alberta. We had seen a fish jump in the pool so when we noticed an Osprey hovering overhead, we assumed that the Osprey used the pool for fishing and we ignored it.

We executed a perfect capture of the hen and all five of her ducklings which were able to fly a short distance (class III ducklings). After banding and releasing the birds downstream, we saw the Osprey suddenly dive at the brood. The Osprey hit the water but missed the ducklings. The hen immediately led the brood out of the water and onto the shore where they hid among rocks. The Osprey continued to hover and made faint attempts to dive, but after 2 or 3 minutes, circled around us and continued flying upstream.

This experience brought to mind another observation I had made with Mark Bugera the previous year on 7 June 1997. At 6:00 PM, we were watching a Harlequin Duck pair preening on the edge of the Gregg River which is a tributary to the McLeod River. The female suddenly crouched down, moved toward shore and hid beside a rock. The male also crouched down and did not move. We looked up and saw an Osprey flying upstream along the river. At the time, I assumed we were observing a generalized response to an aerial stimulus. Our 1998 observation of the Osprey attack on the harlequin brood suggests however, that the hen's actions may have been a species-specific anti-predator response.

- *Beth MacCallum*, 176 Moberly Drive, Hinton, AB T7V 1Z1.

COMPTON TORTOISESHELL DEATHS IN ABANDONED CARS

Recently in arranging the *Nymphalis* butterflies in my collections, I came upon a series of 52 specimens saved for me by Leonard Gareau. They were all found dead on August 20,1989 at Swan River, Manitoba in abandoned cars on a farm. There were over 70 specimens, but only 52 were in good enough condition to preserve as study specimens. The others were evidently eaten by mice or shrews. They form an impressive series well illustrating the great variation in pastel colours on the underside of the wings, resembling some African species in this regard.

Compton Tortoiseshells pass the winter as adults, and in searching for places to hibernate, could enter abandoned cars from the bottom. Once inside cars with tightly closed windows, they would be unable to escape and may have been killed by high temperatures in the cars.

The death of butterflies in abandoned cars is not new. I have seen crescents (*Phyciodes*) and many sulphurs so trapped - often only individually or only a few specimens over the years. I have not seen mention of this phenomenon in the published literature available to me in The Pas.

Considering the vast number of abandoned cars around North America, this butterfly carnage must be great in particular in the winter hibernating species. This may well be contributing to the decimation of butterflies from an extraordinary and unexpected source.

- *Walter Krivda*, P.O. Box 864, The Pas, Manitoba R9A 1K8

VARIED THRUSH WINTERS AT MELFORT

On January 2, 2003, Ray and I noticed an unfamiliar and colorful bird at our backyard feeder. We checked our bird books and consulted Stuart Houston, and identified it as a male Varied Thrush. "Rusty," as we called him, was shy and difficult to photograph but we finally got some shots with a telephoto lens through the window to confirm our identification.

Rusty seemed unable to crack the sunflower seeds in our feeder, so we put out a mixture of shelled sunflower seeds, pumpkin seeds, nuts, berries and suet. But his favorite food was bread, and a good friend, Joyce Koroluk, made him special loaves of bread filled with nuts and grain.

He would sit eating bread, all fluffed out, for long periods when the temperature was -20°C to -30°C. He would then move to an adjacent fir for awhile before coming back to the feeder. He got along well with the resident House Sparrows and Black-capped Chickadees.

As milder weather returned, Rusty's orange seemed brighter, he was sleeker looking and his back became a beautiful slate blue. He left us on April 7, 2003 after a stay of more than three months.

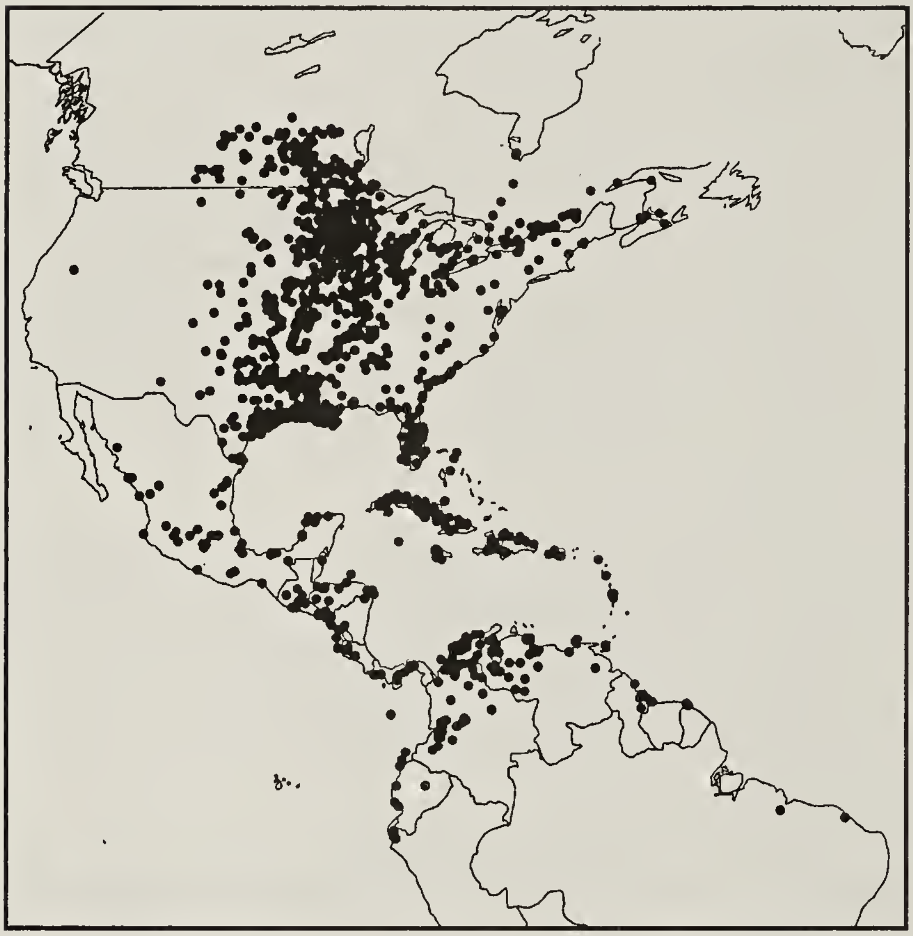
Stuart Houston informs me that only one other Varied Thrush, one at Stenen, has stayed successfully through the winter, as ours did. We will watch anxiously to see whether he will return to Melfort next winter.

– *Joyce Pannell,* Box 879, Melfort SK S0E 1A0.

Varied Thrush at our feeder

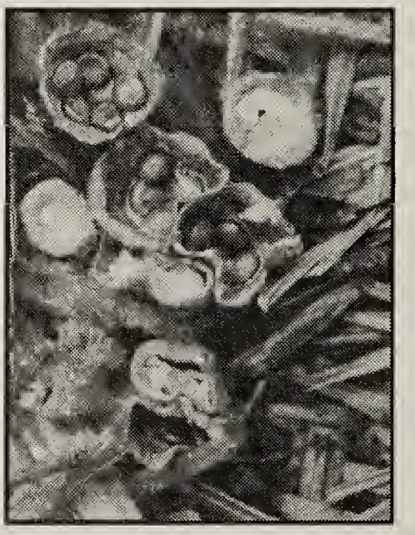
MYSTERY PHOTO

JUNE 2003 MYSTERY PHOTO



What species of bird is this? Map submitted by Stuart Houston.

ANSWER TO MARCH 2003 MYSTERY PHOTO



All who wrote in about the March mystery photo correctly identified the nests as bird's-nest fungi.

Rain drops splashing into the nests dislodge the "eggs" (peridioles) which fly out of the cup. Later the walls of the peridioles break down, releasing the spores that they contain. This process is, logically enough, termed the "splash cup method of spore dispersal."

CORRIGENDUM

LOGGERHEAD SHRIKE BANDING ON THE PRAIRIES

by C. S. Houston, K. D. de Smet and D. M. Collister, March 2003.

In line two in paragraph one, 2000 should be replaced with 1991 so that the sentence reads: "In eastern Canada the status was raised to endangered in 1991". This information is found in COSEWIC. 1995. Canadian Species at Risk. Committee on the Status of Endangered Wildlife in Canada. Unpublished Report. 16 pp.

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